SOAP AND CHEMICAL SPECIALTIES

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1961 BLUE BOOK

Catalog

• • • •

BUYERS' GUIDE and DIRECTORY

FOR MANUFACTURERS, CONVERTERS AND REPACKERS OF SOAPS • DETERGENTS • TOILET GOODS • CLEANERS • AEROSOLS • INSECTICIDES • DISINFECTANTS • FLOOR WAXES AND POLISHES • AUTOMOTIVE SPECIALTIES • OILS, FATS AND GREASES • SANITIZERS • STOCK SPRAYS • DENTIFRICES • TEXTILE SPECIALTIES • WEED CHEMICALS • OTHER HOUSEHOLD AND INDUSTRIAL CHEMICAL SPECIALTIES.

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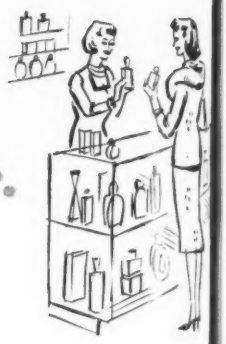

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1961

BLUE BOOK

CATALOG of

SOAP & CHEMICAL SPECIALTIES

THE 1961 BLUE BOOK Catalog is divided into two sections, a *Buyers' Guide* and a *Directory* of the trade.

In the *Buyers' Guide* are listed alphabetically the leading sources of supply of over 1,000 raw materials, equipment, containers, accessories and services used by manufacturers, converters, and repackers of soaps, detergents, toilet goods, cleaners, aerosols, insecticides, disinfectants, floor waxes and polishes, automotive specialties, oils, fats and greases, sanitizers, stock sprays, dentifrices, textile specialties, weed chemicals and other household and industrial chemical specialties.

The *Directory* contains both the biological and chemical analysis Test Methods of the Insecticide Division of the Chemical Specialties Manufacturers Association. Checked by the CSMA Scientific Committee and the CSMA Insecticide Chemical Analysis Committee, the Test Methods are the latest revisions as of the date of the compilation of this edition of the BLUE BOOK. However, readers are cautioned that changes may be made during the year and that it may be well to check if amended versions have been issued by the CSMA.

Also included in the *Directory* are a listing of trade association officials, specifications for carnauba wax, a chart of water hardness values in the U. S., and the index of articles in monthly issues of *Soap and Chemical Specialties* for the years, 1960, 1959, 1958.

Thirty-Fourth Edition

(Included without charge in annual subscription to "Soap & Chemical Specialties")

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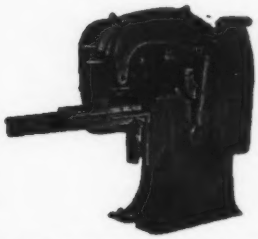

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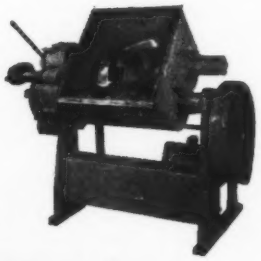

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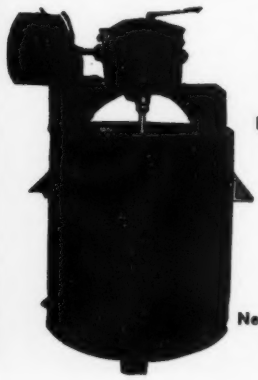

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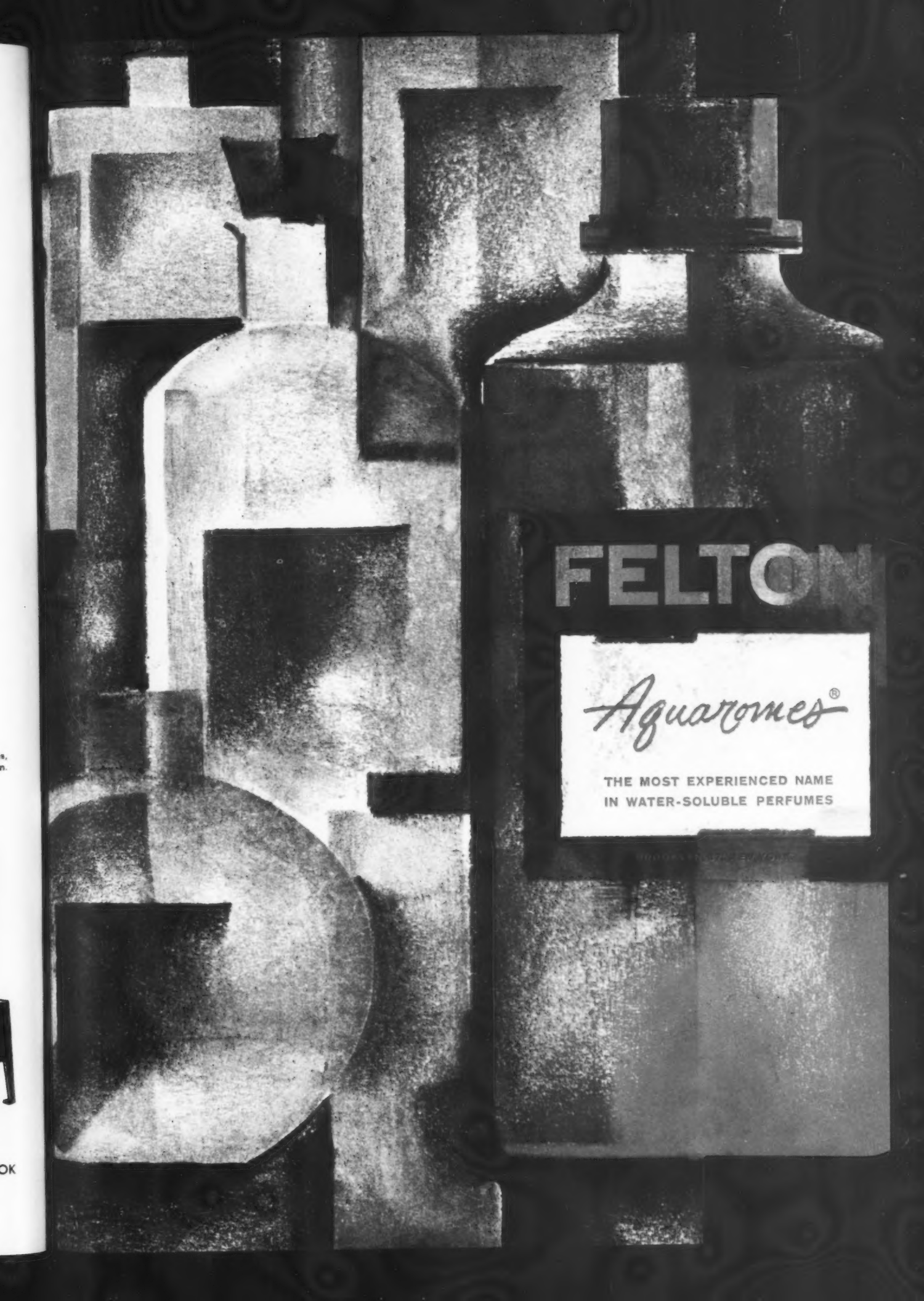
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Buyers' Guide Section

IN this *Buyers' Guide* are listed alphabetically the leading sources of supply for manufacturers, converters and repackers of over 1,000 raw materials, equipment, containers, services and accessories, used in the soap, detergent and chemical specialties fields. Listings have been revised and new ones added to reflect latest practices and manufacturing methods in the soap, detergent and chemical specialties industries. Every attempt has been made to keep this *Buyers' Guide* accurate and up-to-date.

If you are looking for a manufacturer or supplier of a product or service not listed, drop a line to the SOAP BLUE BOOK, and the editors will try to locate a source of supply. However, first check thoroughly the listings and advertisements.

If you have a product or offer equipment or a service which should be included in this *Buyers' Guide*, write us for a questionnaire so that your firm may be included in next year's edition. However, bear in mind that the BLUE BOOK is not a general chemical directory, but is published specifically for manufacturers, converters and repackers of soaps, detergents, toilet goods, cleaners, aerosols, insecticides, disinfectants, floor waxes and polishes, automotive specialties, oils, fats and greases, sanitizers, stock sprays, dentifrices, chemicals and other household and industrial chemicals.

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Eagle-Picher Co., American Bldg., Cincinnati, O.
C. P. Hall Co., 414 S. Broadway, Akron, O.
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Minerals & Chems. Phillip Corp., Menlo Park, N. J.
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Jas. H. Rhodes & Co., 157 W. Hubbard St., Chicago
Southeastern Clay Co., Aiken, S. C.
Tamms Industries, Inc., 228 N. La Salle St., Chicago
Universal Marble Products, Thornwood, N. Y.
United Clay Mines Corp., 101 Oakland St., Trenton, N. J.
R. T. Vanderbilt Co., 230 Park Ave., N. Y.
Charles A. Wagner Co., 4455 N. 6th St., Phila.
Whittaker Clark & Daniels, 100 Church St., N. Y.

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FMC Packaging Machy Div., 4972 Summerdale Ave., Phila., Pa.
Filpaco Industries, 2464 S. Michigan Ave., Chicago 16
Horix Mfg. Co., 2609 Chartiers Ave., Pittsburgh 4
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Karl Kiefer Machine Co., 919 Martin St., Cincinnati
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MRM Co., 191 Berry St., Brooklyn

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A. R. Maas Chem. Co., 4570 Ardine St., South Gate, Calif.
Publicker Industries, 1429 Walnut St., Phila 2
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Hooker Chem. Corp., Niagara Falls, N. Y.
Mallinckrodt Chem. Co., St. Louis
Merck & Co., Rahway, N. J.
Monsanto Chemical Co., St. Louis 24, Mo.
S. B. Penick & Co., NYQ Chem. Div., 100 Church St., N. Y. 8
Chas. Pfizer & Co., 630 Flushing Ave., Bklyn.
Stauffer Chem. Co., 380 Madison Ave., N. Y. 17

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Antara Chems. Div., 435 Hudson St., N. Y. 14
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Blockson Chemicals, Joliet, Ill.
Diamond Alkali Co., Union Commerce Bldg., Cleveland
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Food Machy. & Chem. Corp., 161 E. 47 St., N. Y. 17
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Harshaw Chem. Co., 1945 E. 97th St., Cleveland
Heyden Chem. Div., Heyden Newport Chem. Corp., 342 Madison Ave., N. Y.
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Minnesota Mining & Mfg., St. Paul
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Pennsalt Chems. Corp., 3 Penn Center, Phila.
Phosphorus Div., Hooker Chem. Corp., 666 5th Ave., N. Y.
Reichhold Chems., Inc., White Plains, N. Y.
Rohm & Haas Co., 222 W. Washington Sq., Phila.
Robeco Chemicals, Inc., 25 E. 26th St., N. Y.
Stauffer Chem. Co., 380 Madison Ave., N. Y.
Tennessee Corp., 619 Grant Bldg., Atlanta, Ga.
Jos. Turner & Co., Ridgefield, N. J.
Union Carbide Chemicals Co., 270 Park Ave., N. Y.
U. S. Industrial Chems. Co., 99 Park Ave., N. Y.
Victor Chemical Works, 155 N. Wacker Dr., Chicago 6
Virginia-Carolina Chem. Corp., Richmond, Va.

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Whittaker, Clark & Daniels, 100 Church St., N. Y.
Witco Chemical Co., 122 E. 42nd St., N. Y.

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Alco Oil & Chemical Corp., Trenton Ave. & Williams St., Philadelphia
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Darling & Co., 4201 Ashland Ave., Chicago 9
E. I. du Pont de Nemours & Co., Wilmington, Del.
Eastman Chem. Prods., Kingsport, Tenn.
Finetex, Inc., 418 Falmouth Ave., East Paterson, N. J.
General Aniline & Film Corp., 435 Hudson St., N. Y. 14
General Mills, Chem. Div., Kankakee, Ill.
Monsanto Chem. Co., St. Louis, Mo.
Morningstar-Paisley, Inc., 630 W. 51st St., N. Y.
National Starch & Chem. Corp., 750 Third Ave., N. Y. 17
Rohm & Haas Co., 222 W. Washington Sq., Phila.
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Ludwig Closure Co., 185 Oakland St., Bklyn. 22
Metal Fabrications, Inc., 202 Cherry St., Waterbury, Conn.
Owens-Illinois Glass Co., Toledo, O.
Penn Cork & Closures, 1155 Manhattan Ave., Brooklyn
Precision Valve Corp., 700 Nepperhan Ave., Yonkers, N. Y.
Richford Corp., 3618 Oceanside Rd., Oceanside, N. Y.
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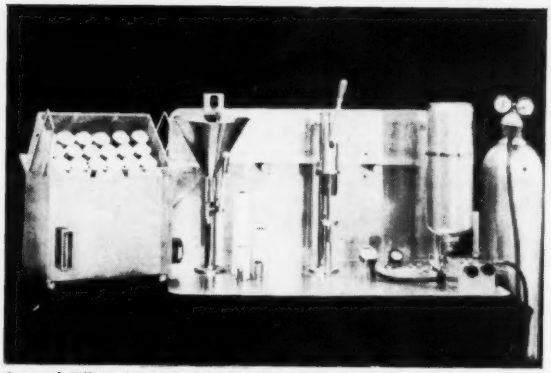

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TECHNICAL AID AVAILABLE: The engineering department of Pressure Pak will furnish technical assistance on general formulation and aid in locating sources of supply for components upon request. There is no charge for this service.

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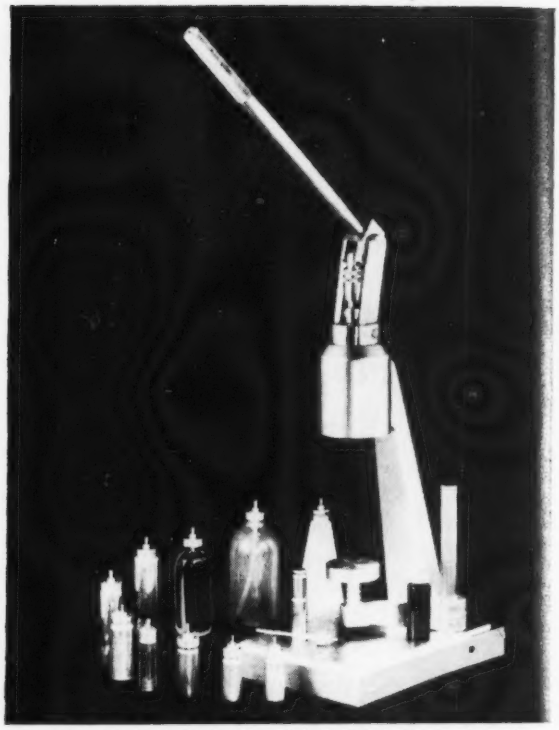

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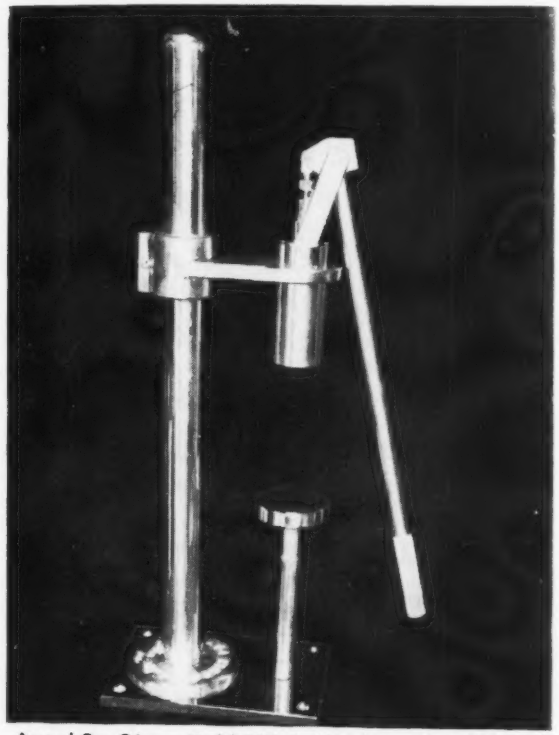

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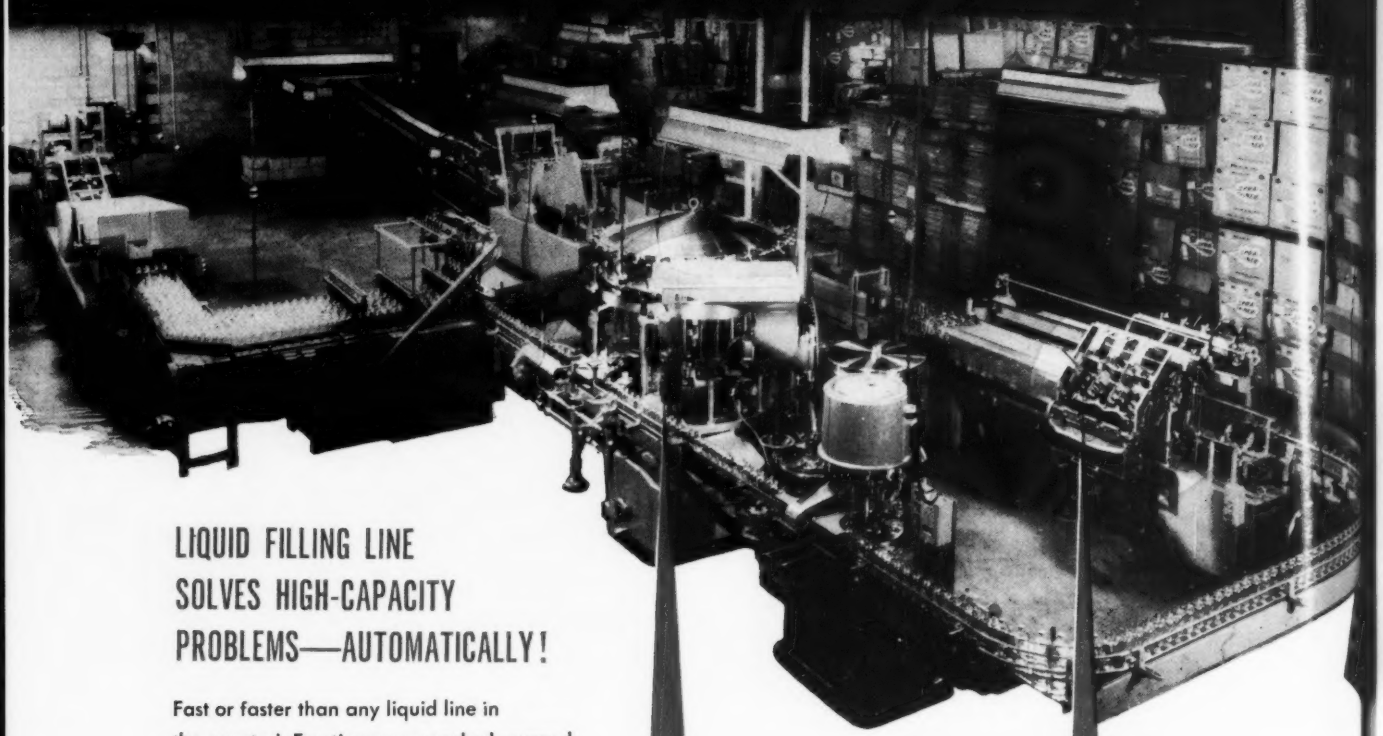

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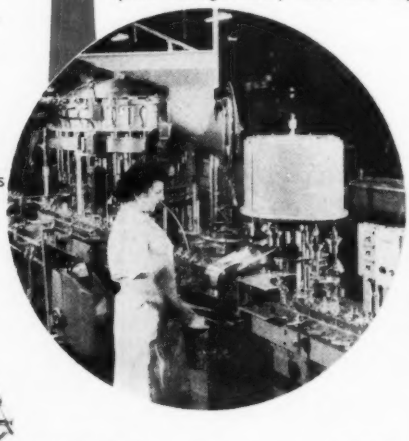

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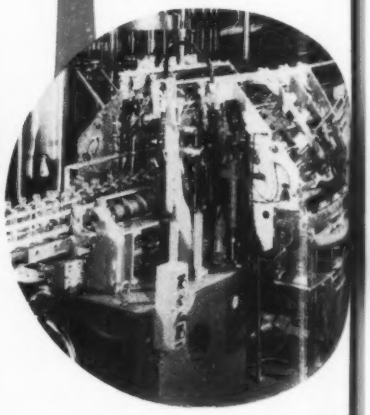

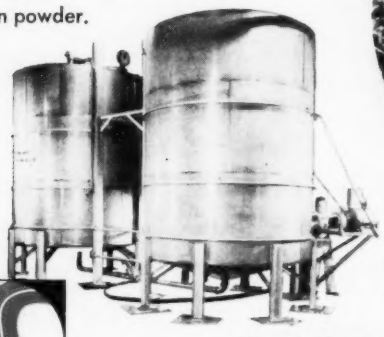

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Lautier Fils, 321 Fifth Ave., N. Y.
Geo. Lueders & Co., 427 Washington St., N. Y.
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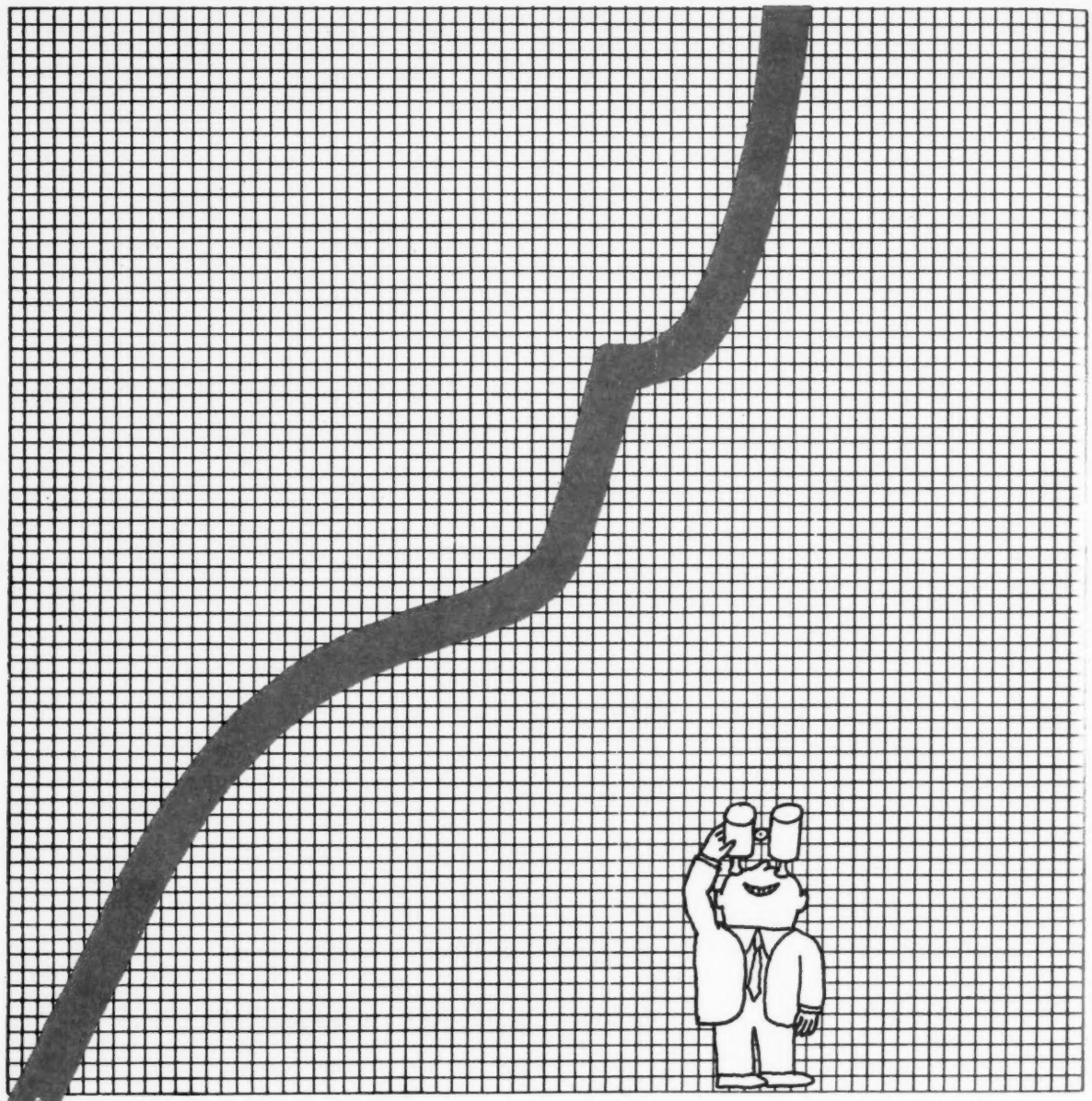

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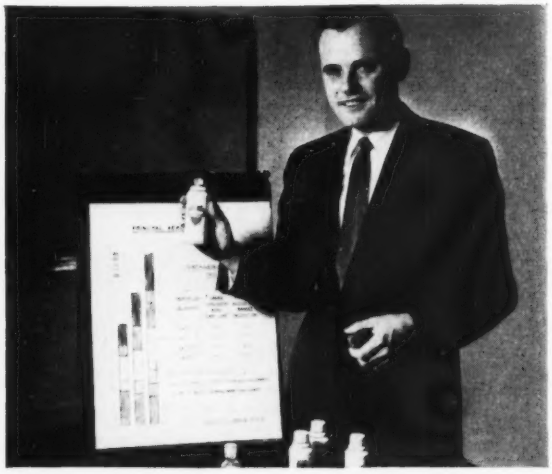

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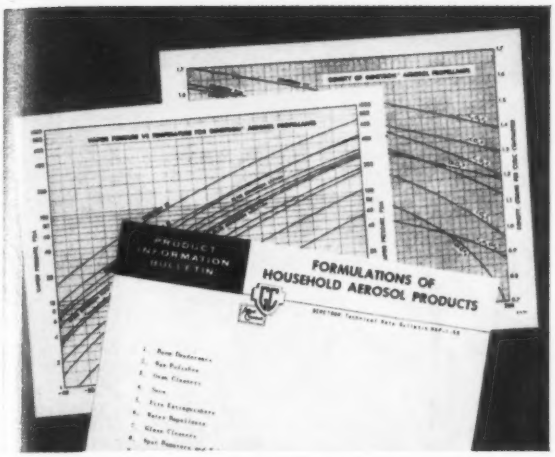

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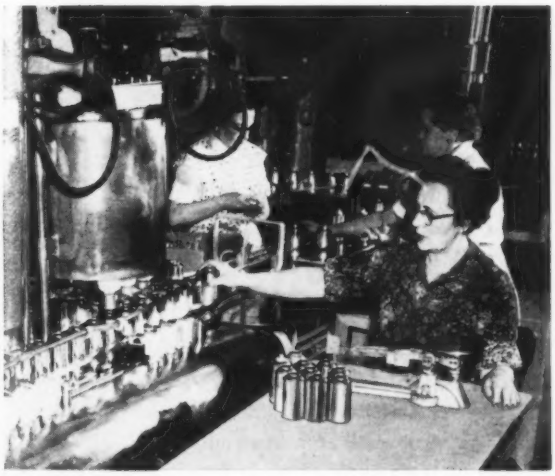

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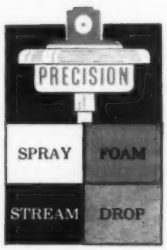

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Pan-Pak, Inc., High St., Attica, N. Y.
Par Industries, 2193 E. 14th St., Los Angeles 21
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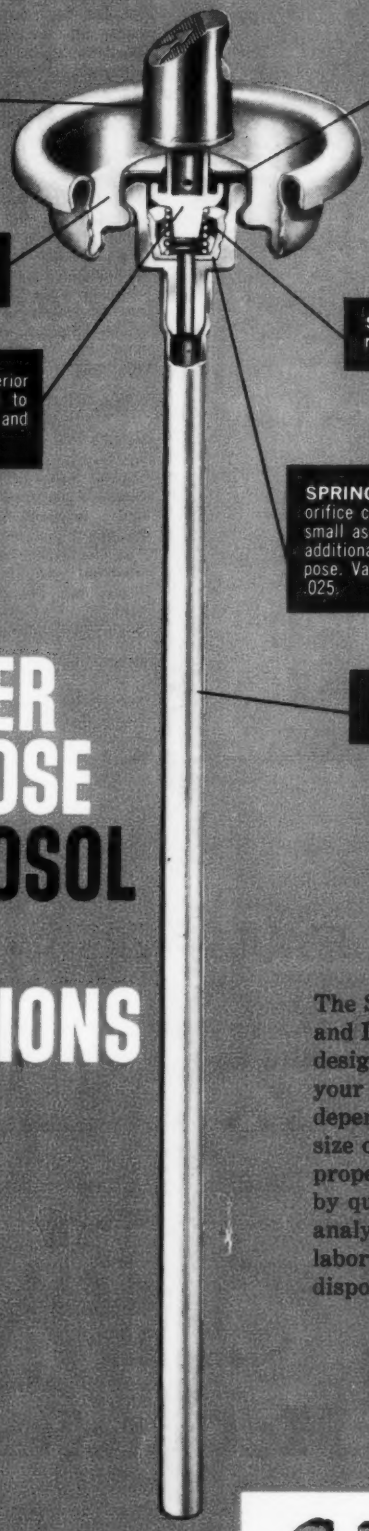
MOUNTING CUP: Tin plate available with epoxy or vinyl coat.

STEM: duPont "Zytel" nylon. Interior orifice hole can range from .013 to .030 to handle various viscosities and spray patterns.



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Aerosol Valves

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AEROSOL VALVE SPECIFICATIONS

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BUTTON	Orifice .016	Orifice .016	Orifice .016	Mechanical Breakup	.013 to .030
RUBBER GASKET	Neoprene Buna	Neoprene Buna	Neoprene Buna	Neoprene Buna	
STEM ORIFICE	Nylon .016	Nylon .016	Nylon .016	Delrin .016	.013 to .030
SPRING	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel	
SPRING CUP (BODY) ORIFICE	Nylon .062	Nylon .062	Nylon .062	Nylon Restricted Entrance .016 Vapor Tap .016	.013 to .062 .013 to .025
MOUNTING CUP 1 lb. Tin Plate (a) Coated after forming (b) Dimple	epoxy No	Yes	No	epoxy No	Epoxy or Vinyl on one or both sides
DIP TUBE	Stress crack-resistant Polyethylene				Any length*
NOMINAL DISCHARGE RATE	60 gr. per min.	60 gr. per min.	60 gr. per min.	21 gr. per min.	
COLOR	Buttons available in any color				

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Risdon Mfg. Co., 400 Risdon St., Naugatuck, Conn.
A. Schrader's Son, 470 Vanderbilt Ave., Brooklyn 16, N. Y.
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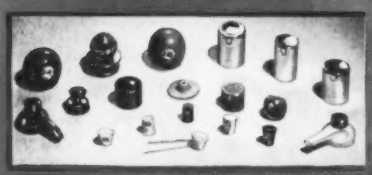

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Reichhold Chemicals, Inc., White Plains, N. Y.
Tennessee Prods. & Chem. Corp., Nashville, Tenn.
Joseph Turner & Co., Ridgefield, N. J.
Union Carbide Chems. Co., 270 Park Ave., N. Y.
U. S. Industrial Chemicals, Inc., 99 Park Ave., N. Y.

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Commercial Solvents Corp., 260 Madison Ave., N. Y.
Eastman Chemical Prods., Kingsport, Tenn.
Enjay Chem. Co., 15 W. 51st St., N. Y. 19
Monsanto Chem. Co., St. Louis
Publicker Industries, Inc., 1429 Walnut St., Phila. 2
Shell Chem. Corp., 50 W. 50th St., N. Y. 20
Joseph Turner & Co., Ridgefield, N. J.
Union Carbide Chems. Co., 270 Park Ave., N. Y.
U. S. Industrial Chemicals, Inc., 99 Park Ave., N. Y.

ALCOHOL, ISOOCTYL

Amoco Chems. Corp., 130 E. Randolph Dr., Chicago 1
Eastman Chem. Prods., Inc., Kingsport, Tenn.
Enjay Chem. Co., 15 W. 51st St., N. Y. 19
Union Carbide Chems. Co., 270 Park Ave., N. Y.
Gulf Oil Corp., 360 Lexington Ave., N. Y. 17

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Amsco Solvents & Chemicals Co., 4619 Reading Road, Cincinnati 29
Buffalo Solvent & Chemicals Corp., Box 73, Station B, Buffalo 7, N. Y.
Central Solvents & Chemicals Co., 2540 W. Flournoy St., Chicago 12, Ill.
Commercial Solvents Corp., 260 Madison Ave., N. Y.
Dixie Solvents & Chems. Co., Dixie Highway, Louisville, Ky.
Enjay Chem. Co., 15 W. 51st St., N. Y. 19
Hoosier Solvents & Chemicals Corp., 1650 Luett Ave., Indianapolis 22
Merck & Co., Rahway, N. J.
Missouri Solvents & Chemicals Co., 419 De Soto Ave., St. Louis 7, Mo.
Ohio Solvents & Chemicals Co., 3470 W. 140th St., Cleveland
Pennsalt Chemicals Corp., 3 Penn Center Plaza, Phila.
Southern Solv. & Chems. Co., 917 Jefferson Highway, New Orleans
Texas Solvents & Chemicals Co., 8501 Market St., Houston 15, Texas
Toledo Solv. & Chems. Co., 4051 South Ave., Toledo, O.
Joseph Turner & Co., Ridgefield, N. J.
Union Carbide Chems. Co., 270 Park Ave., N. Y.
U. S. Industrial Chemicals, Inc., 99 Park Ave., N. Y.
Western Solvents & Chemicals Co., 6472 Selkirk Ave., Detroit 11, Mich.
Wisconsin Solvents & Chemicals Corp., 1719 S. 83rd St., Milwaukee
Wolverine Solv. & Chem. Co., 2940 Stafford Ave., S.W., Grand Rapids

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Enjay Chem. Co., 15 W. 51st St., N. Y. 19
Shawinigan Resins Corp., Springfield 1, Mass.

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Union Carbide Chems. Co., 270 Park Ave., N. Y.

ALDRIN

Shell Chem. Corp., 110 W. 51 St., N. Y.

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Agricultural Processing Industries, Denver, Colo.
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Arizona Fertilizers, Inc., Phoenix, Arizona
Atlas Chem. Corp., Waynesboro, Ga.
Baird & McGuire, Inc., Holbrook, Mass.
California Spray-Chemical Corp., Richmond, Calif.
Carolina Chemicals, Inc., West Columbia, S. C.
Chapman Chem. Co., Dermon Bldg., Memphis, Tenn.
Chemical Compounding Corp., 262 Huron St., Bklyn.
Chemical Insecticide Corp., 30 Whitman Ave., Metuchen, N. J.
Chipman Chemical Co., Bound Brook, N. J.
Coahoma Chemical, Inc., Beacon, N. Y.
Diamond Alkali Co., Union Commerce Bldg., Cleveland
Douglas Chem. Co., 620 E. 16th Ave., North Kansas City, Mo.
Flag Sulphur & Chemical Co., Tampa, Fla.
Food Machy. & Chem. Corp., 441 Lexington Ave., N. Y.
Florida Agricultural Supply Co., P. O. 658, Jacksonville, Fla.
Geigy Agricultural Chemicals, Ardsley, N. Y.
Hub States Chem. & Equipt. Co., 1255 N. Windsor St., Indianapolis
McLaughlin Gormley King Co., 1715 5th St., S.E., Minneapolis 14
Naco Fertilizer Co., Charleston, S. C.
Morton Chem. Co., 110 N. Wacker Dr., Chicago 6
S. B. Penick & Co., 100 Church St., N. Y. 8
Pennsalt Chems. Corp., 3 Penn Center, Phila.
Prentiss Drug & Chem. Co., 101 W. 31 St., N. Y. 1
Private Brands, Inc., 300 S. 3 St., Kansas City, Kan.
Southern Solv. & Chem. Corp., 1352 Jefferson Highway, New Orleans
Plainsman Supply Co., Plainview, Texas
Reasor-Hill Corp., Jacksonville, Ark.
Stauffer Chem. Co., 380 Madison Ave., N. Y.
Triangle Chemical Co., Macon, Ga.
Tyner Petrus Co., W. Monroe, La.
United-Heckathorn, 600 S. 4 St., Richmond, Calif.
Virginia-Carolina Chemical Corp., Richmond, Va.
Woolfolk Chemical Wks., Fort Valley, Ga.

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Food Machy. & Chem. Corp., 441 Lexington Ave., N. Y.
McLaughlin, Gormley, King Co., 1715 S. E. 5th St., Minneapolis, Minn.
S. B. Penick & Co., 100 Church St., N. Y. 8
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Belmont Smelting & Ref. Co., 318 Belmont Ave., Bklyn., N. Y.
Reynolds Metals Co., Louisville 1, Ky.

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J. T. Baker Chem. Co., Philipsburg, N. J.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Mallinckrodt Chemical Wks., St. Louis 7, Mo.
Stauffer Chem. Co., 380 Madison Ave., N. Y.
Joseph Turner & Co., Ridgefield, N. J.

ALUMS

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Harshaw Chemical Co., 1945 E. 97th St., Cleveland
Mallinckrodt Chemical Wks., St. Louis 7
Merck & Co., Rahway, N. J.
Monsanto Chemical Co., St. Louis, Mo.
Olin Mathieson Chem. Corp., Industrial Chems., Baltimore 3
Pennsalt Chems. Corp., 3 Penn Center, Phila.
Rohm & Haas Co., 222 W. Washington Sq., Phila.
Stauffer Chem. Co., 380 Madison Ave., N. Y.
Joseph Turner & Co., Ridgefield, N. J.
Welch, Holme & Clark Co., 1 Hudson St., N. Y.

AMINOHYDROXY COMPOUNDS

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Commercial Solvents Corp., 260 Madison Ave., N. Y.
Dow Chemical Co., Midland, Mich.
General Mills, Inc., Kankakee, Ill.
Jefferson Chemical Co., 1121 Walker Ave., Houston, Tex.
Mallinckrodt Chemical Wks., St. Louis 7
Monsanto Chemical Co., St. Louis, Mo.
Nalco Chem. Co., 6216 W. 66 Pl., Chicago 38
Olin Mathieson Chem. Corp., Organic Chems., 745 5th Ave., N. Y. 22
Pennsalt Chems. Corp., 3 Penn Center, Phila.

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American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
Armour Industrial Chem. Co., 110 N. Wacker Dr., Chicago

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Commercial Solvents Corp., 260 Madison Ave., N. Y.
Dow Chem. Co., Midland, Mich.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Food Machy. & Chem. Corp., 441 Lexington Ave., N. Y.
Harshaw Chemical Co., 1945 E. 97th St., Cleveland 6
Hercules Powder Co., Wilmington, Del.
Hooker Chem. Corp., Niagara Falls, N. Y.
Mallinckrodt Chemical Wks., St. Louis
Merck & Co., Rahway, N. J.
Monsanto Chemical Co., St. Louis, Mo.
Olin Mathieson Chem. Corp., Ind. Chems., Baltimore 3
Pennsalt Chemicals Corp., 3 Penn Center, Phila. 2
Robeco Chemicals, Inc., 23 E. 26th St., N. Y.
Rohm & Haas Co., 222 W. Washington Sq., Phila.
Shell Chem. Corp., 50 W. 50 St., N. Y. 20
Sinclair Petrochems., 600 5th Ave., N. Y. 20
Sun Oil Co., 1608 Walnut St., Phila.
Texaco, Inc., 135 E. 42nd St., N. Y. 17
Jos. Turner & Co., Ridgefield, N. J.
U. S. Industrial Chems. Co., 99 Park Ave., N. Y. 16

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Harshaw Chem. Co., 1945 E. 97 St., Cleveland

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Allied Chem. Corp., Solvay Process Div., 61 Broadway, N. Y.
American-British Chem. Supplies, 180 Madison Ave., N. Y. 16
J. T. Baker Chemical Co., Phillipsburg, N. J.

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American-British Chem. Supplies, 180 Madison Ave., N. Y. 16
J. T. Baker Chem. Co., Phillipsburg, N. J.
Harshaw Chem. Co., 1945 E. 97th St., Cleveland
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Merck & Co., Rahway, N. J.
Robeco Chemicals, Inc., 23 E. 26 St., N. Y. 10

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J. T. Baker Chem. Co., Phillipsburg, N. J.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Mallinckrodt Chem. Wks., St. Louis 7
Merck & Co., Rahway, N. J.
S. B. Penick & Co., NYQ Chem. Div., 100 Church St., N. Y. 8
Pennsalt Chems. Corp., 3 Penn Center Plaza, Phila.
Robeco Chemicals, Inc., 23 E. 26 St., N. Y.
Joseph Turner & Co., Ridgefield, N. J.
Welch, Holme & Clark Co., 1 Hudson St., N. Y.

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Morton Chem. Co., 110 N. Wacker Dr., Chicago 6
Rayette, Inc., 261 E. 5th St., St. Paul, Minn.
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Hysan Products Co., 930 W. 38th Place, Chicago
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S. B. Penick & Co., 100 Church St., N. Y. 8
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Residex Corp., Clark, N. J.
Sennewald Drug Co., Inc., 2721 Chouteau Ave., St. Louis
J. A. Tumbler Labs., 423 Hanover St., Baltimore
Uncle Sam Chem. Co., 573 W. 131st St., N. Y.
United-Heckathorn, 600 S. 4 St., Richmond, Calif.
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Catalin Corp., of America, 1 Park Ave., N. Y.
Dow Chem. Co., Midland, Mich.
E. I. du Pont de Nemours & Co., Wilmington, Dela.
Eastman Chem. Prods., Kingsport, Tenn.
Enjay Chem. Co., 15 W. 51st St., N. Y. 19
Fine Organics, Inc., 205 Main St., Lodi, N. J.
Fleetwood Prods. Co., 509 5th Ave., N. Y. 17
Geigy Industrial Chemicals, Ardsley, N. Y.
B. F. Goodrich Chemical Co., 3135 Euclid Ave., Cleveland 15
R. W. Greeff & Co., 10 Rockefeller Plaza, N. Y. 20
Heyden Chem. Div., Heyden Newport Chem. Corp., 342 Madison Ave. N. Y.
Jefferson Chem. Co., 1121 Walker Ave., Houston, Tex.
Merck & Co., Rahway, N. J.
Minnesota Mining & Mfg. Co., St. Paul
Monsanto Chemical Co., St. Louis 24, Mo.
Nopco Chem. Co., 60 Park Pl., Newark, N. J.
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Onyx Chemical Corp., Warren & Morris Sts., Jersey City 2, N. J.
Pennsalt Chems. Corp., 3 Penn Center, Phila.
Chas. Pfizer & Co., 630 Flushing Ave., Bklyn. 6
Pitt-Consol Chem. Co., 191 Doremus Ave., Newark, N. J.
Shell Chem. Corp., 50 W. 50th St., N. Y. 20
Sinclair Petrochemicals, Inc., 600 5th Ave., N. Y. 20
Sindar Corp., 321 W. 44th St., N. Y. C.
Sterwin Chemicals, Inc., 1450 Broadway, N. Y. 18
Van Dyk & Co., Main & Williams Sts., Belleville, N. J.
R. T. Vanderbilt Co., 230 Park Ave., N. Y. 17
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S. B. Penick & Co., 100 Church Ave., New York
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Layflat Products, Inc., 961 Grimmett Dr., Shreveport, La.
Moran Brush Mfg. Co., 30 Manila Ave., Hamden, Conn.
Palmer Fixture Co., 201 Albert St., Waukesha, Wisc.
Uncle Sam Chem. Co., 573 W. 131st St., N. Y.

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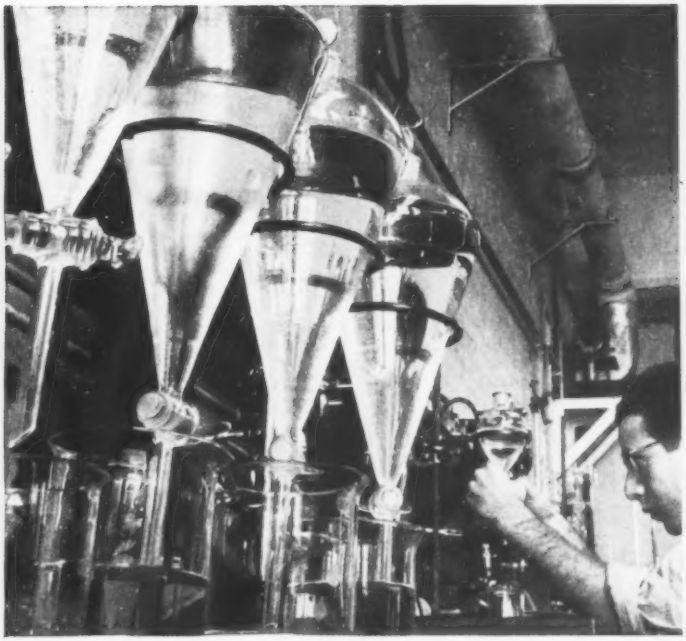
American Aromatics, Inc., 24 E. 21st St., N. Y. 10
Aromatic Products, Inc., 235 4th Ave., N. Y. 3
Berje Chem. Prods., 359 West Broadway, N. Y. 13
Biddle Sawyer Corp., 20 Vesey St., N. Y. 7
W. J. Bush & Co., 137 Boston Post Rd., Cos Cob, Conn.
Charabot, Inc., 114 E. 25th St., N. Y.
Antoine Chiris Co., 220 E. 23nd St., N. Y. C.
Coutin Associates, 381 Park Ave. S., N. Y. 16
Gerard J. Danco Int. Corp., 5 E. 19th St., N. Y. 3
Delaire, Inc., 240 W. 30th St., N. Y.
Descollonges, Inc., 160 5th Ave., N. Y. 10
Doldge & Olcott, Inc., 75 9th Ave., N. Y. 11
Dow Chemical Co., Midland, Mich.
Dragoco, Inc., King Rd., Totowa, N. J.
P. R. Dreyer, Inc., 601 W. 26th St., N. Y.
Eastman Chem. Prods., Kingsport, Tenn.
Felton Chemical Co., 603 Johnson Ave., Brooklyn
Firmenich, Inc., 250 W. 18th St., N. Y.

Givaudan aromatics—keystones of progress in perfume chemistry



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nyl Acetaldehyde and Acetal • Phenyl Ethyl Alcohol and Derivatives
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Florasynth Laboratories, 900 Van Nest Ave., N. Y.
Fries & Fries, Inc., 110 E. 70th St., Cincinnati
Fritzsche Brothers, Inc., 76 Ninth Ave., N. Y.
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Heine & Co., 601 W. 26th St., N. Y. 1
Heyden Chem. Div., Heyden Newport Chem. Corp., 342 Madison Ave, N. Y.
Hoffman-LaRoche, Inc., Nutley, N. J.
D. W. Hutchinson & Co., 700 South Columbus Ave., Mt. Vernon, N. Y.
International Flavors & Fragrances, Inc., 521 W. 57 St., N. Y. C.
Kay-Fries Chems., Inc., 180 Madison Ave., N. Y. 16
Lautier Fils Inc., 321 Fifth Ave., N. Y.
George Lueders & Co., 427 Washington St., N. Y.
Magnus, Mabee & Reynard, 16 Desbrosses St., N. Y.
Maywood Chemical Works, Maywood, N. J.
Neumann-Buslee & Wolfe, 5800 Northwest Highway, Chicago
N. Y. Aromatics Corp., Highbridge, N. J.
Norda Essential Oil & Chem. Co., 601 W. 26th St., N. Y.
Noville Essential Oil Co., 1312 5th St., N. Bergen, N. J.
Orbis Products Corp., 601 W. 26th St., N. Y.
S. B. Penick & Co., 100 Church St., N. Y.
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Perry Bros., Inc., 61-12 32nd Ave., Woodside 77, N. Y.
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Reynaud, Ltd., 900 21 St., Union City, N. J.
Rhodia, Inc., 60 E. 56th St., N. Y. 22
F. Ritter & Co., 4001 Goodwin Ave., Los Angeles 39
Roubechez, Inc., 39 Roselle St., Mineola, N. Y.
Roure-Dupont, 366 Madison Ave., N. Y.
Schimmel & Co., Newburgh, N. Y.
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Shulton, Inc., 630 5 Ave., N. Y.
Synfleur Scientific Labs., Monticello, N. Y.
Syntomatic Corp., 114 E. 32nd St., N. Y.
A. M. Todd Co., Kalamazoo, Mich.
Tombarel Products Corp., 725 Broadway, N. Y. 3
Trubek Laboratories, E. Rutherford, N. J.
Ungerer & Co., 161 Avenue of Americas, N. Y.
Van Dyk & Co., Belleville 9, N. J.
Albert Verley & Co., 1375 E. Linden Ave., Linden, N. J.
Verona Aromatics, 26 Verona Ave., Newark, N. J.

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Baird & McGuire, Inc., Holbrook, Mass.
Californa Spray-Chemical Corp., Richmond, Calif.
Chem. Insecticide Corp., 30 Whitman Ave., Metuchen, N. J.
Chipman Chemical Co., Bound Brook, N. J.
James Good Co., 2104 Susquehanna Ave., Phila.
Industrial Materials Co., 1017 McCall St., Houston
McLaughlin Gormley King Co., Minneapolis
Thompson-Hayward Chemical Co., 2015 Southwest Blvd., Kansas City Mo.
U. S. Sanitary Spec. Corp., 1001 S. California Blvd., Chicago 12
James Varley & Sons, 1200 Switzer Ave., St. Louis

ATOMIZERS (see Sprayers, Atomizing)

BACTERIOSTATS

American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
Antara Chem. Div., 435 Hudson St., N. Y. 14
Archer-Daniels-Midland Co., Minneapolis
Armour Industrial Chem., 110 N. Wacker Dr., Chicago
Barlow Chem. Corp., Ossining, N. Y.
Bex Sales Div., 115 W. 27 St., N. Y. 1
Catalin Corp. of America, 1 Park Ave., N. Y.
Chemical Products Corp., East Paterson, N. J.
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Dow Chem. Co., Midland, Mich.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Fine Organics, Inc., 205 Main St., Lodi, N. Y.
Fleetwood Prods. Co., 509 5th Ave., N. Y.
Geigy Industrial Chemicals, Ardsley, N. Y.
General Mills, Chem. Div., Kankakee, Ill.

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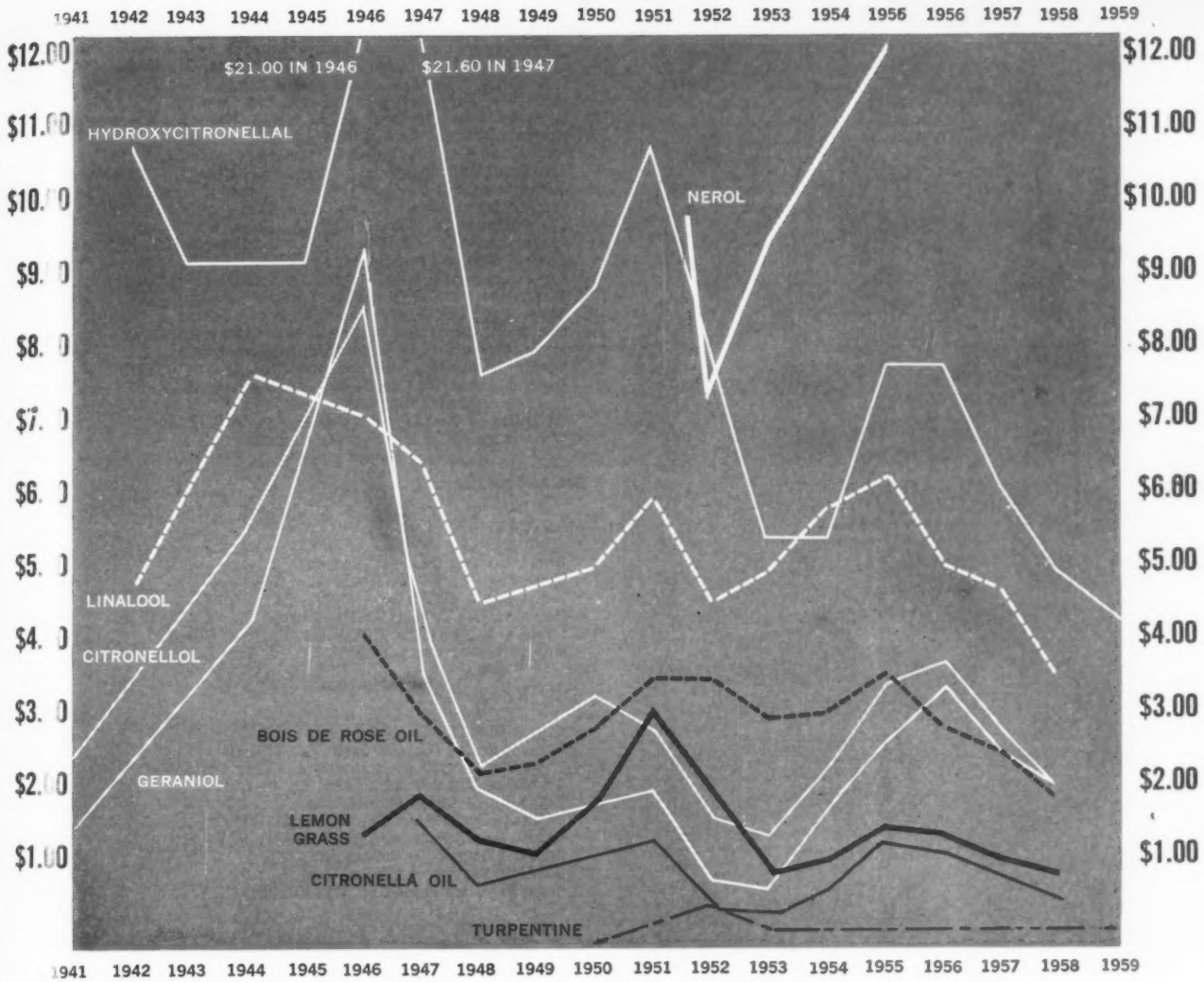

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The new Firmenich-Glidden Aromatics, derived from an abundant domestic source, make it possible for you to use the finest quality aromatics as freely as you wish, in any product you wish, with complete confidence that sudden changes in price, quality, and foreign supplies will not disrupt your manufacturing and marketing program.

The economic advantages provided by Firmenich-Glidden Aromatic Chemicals are perhaps best illustrated by reviewing the costs of these same aromatic chemicals as derived from natural sources. The figures demonstrate most forcibly the economic burden which the uncertainties of supply, compounded by natural and artificial restrictions, have placed upon the aromatics consuming industry.

Write for further information on these exceptional new aromatics. Ask for samples in the commercial quantities you need.

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Floor waxes with ASC-4® brand of DIAPHENE make floors really clean. DIAPHENE sanitizes and inhibits odor in one fell swoop, and these benefits last as long as the wax . . . natural or synthetic. Everyone understands these advantages, so floor waxes with DIAPHENE sell like magic.

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We also make QUICKSAN C20, an excellent preservative for emulsion-type floor waxes and paints.

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RIDGEWOOD, N. J.

BACTERIOSTATS (Cont'd.)

Heyden Chem. Div., Heyden Newport Chem. Corp., 342 Madison Ave., N. Y.
Intex Chem. Corp., 167 Main St., Lodi, N. J.
M. Michel & Co., 90 Broad St., N. Y. 4
Monsanto Chemical Co., St. Louis 24, Mo.
Nalco Chem. Co., 6216 W. 66 Pl., Chicago
Onyx Chemical Corp., Warren & Morris Sts., Jersey City, N. J.
Ottawa Chem. Co., 750 N. Wheeling St., Toledo O.
Pennsalt Chems. Corp., 3 Penn Center, Phila.
Chas. Pfizer & Co., 630 Flushing Ave., Bklyn. 6
Refined Prods. Co., 624 Schuyler Ave., Lyndhurst, N. J.
Rohm & Haas Co., Washington Sq., Phila.
Rozilda Laboratories, 44-18 Purvis St., L.I.C., N. Y.
Sandoz, Inc., 61 Van Dam St., N. Y. 13
Sindar Corp., 321 W. 44th St., N. Y. C.
Sole Chem. Corp., 7740 S. Chicago Ave., Chicago 19
Stecker Chems. Inc., 45 N. Broad St., Ridgewood, N. J.
Sterwin Chems., Inc., 1450 Broadway, N. Y. 18
Textilana Corp., 12607 Cerise Ave., Hawthorne, Calif.
R. T. Vanderbilt Co., 230 Park Ave., N. Y. 17
Wilson-Martin Div., Snyder & Swanson St., Phila.
Witco Chem. Co., 122 E. 42 St., N. Y. 17

BAG LINERS (see Liners)

BAGS (Cloth)

Bemis Bro. Bag Co., 601 S. 41st St., St. Louis
Chase Bag Co., 309 W. Jackson Blvd., Chicago
Fulton Bag & Cotton Mills, Atlanta, Ga.
Hammond Bag & Paper Co., Wellsburgh, W. Va.
Mente & Co., Montegut & N. Villere Sts., New Orleans
Virginia-Carolina Chem. Corp., Richmond, Va.

BAGS (Multiwall)

Bagpak Div., 220 E. 42nd St., N. Y.
Bemis Bro. Bag Co., 601 S. 4th St., St. Louis
Chase Bag Co., 509 W. Jackson Blvd., Chicago
Continental Can Co., 100 E. 42nd St., N. Y. 17
Fulton Bag & Cotton Mills, Atlanta
Hammond Bag & Paper Co., Wellsburgh, W. Va.
Hudson Pulp & Paper Co., 505 Park Ave., N. Y.
Kraft Bag Corp., 630—5th Ave., N. Y. 20
St. Regis Paper Co., 230 Park Ave., N. Y.
Union Bag-Camp Paper Corp., 233 Broadway, N. Y.

BAGS, Paper

American Bag & Paper Corp., Water & South Sts., Phila.
Cellu-Craft Prods. Corp., 1401 4 Ave., New Hyde Park, N. Y.
Chase Bag Co., 309 W. Jackson Blvd., Chicago
Continental Can Co., 100 E. 42nd St., N. Y. 17
Equitable Paper Bag Co., 45-50 Van Dam St., Long Island City, N. Y.
Gaylor Container Corp., 111 N. 4th St., St. Louis
Milprint, Inc., Milwaukee 1, Wisc
Oneida Paper Prods. Co., Clifton, N. J.
Premier Bag Co., Lyndhurst, N J.
Union Bag-Camp Paper Corp., 233 Broadway, N. Y.
Western Waxed Paper Div., San Leandro, Calif.

BAGS (Transparent Film)

American Bag & Paper Corp., Water & South Sts., Phila.
Arvey Corp., 3462 N. Kimball Ave., Chicago
Bemis Bros. Bag Co., St. Louis 2
Canton Containers, Inc., Canton, O.
Cellu-Craft Prods. Corp., 1401 4 Ave., New Hyde Park, N. Y.
Chase Bag Co., 309 W Jackson Blvd., Chicago
Continental Can Co., 100 E. 42nd St., N. Y.
Equitable Paper Bag Co., 45-50 Van Dam, L. I. C., N. Y.
H & R Industries, Nazareth, Pa.
Howard Plastics, Council Bluffs, Iowa
Kartidg Pak Co., 9151 W. Fullerton Ave., Franklin Park, Ill.
Milprint, Inc., Milwaukee, Wisc.
Nashua Corp., Nashua, N. H.
Oneida Paper Prods., Inc., 10 Clifton Blvd., Clifton, N. J.
Standard Packaging Corp., 551 5th Ave., N. Y.

BALSAMS (see Essential Oils)

BARREL LINERS, (see Liners)

BARREL PUMPS (see Pumps, Dispensing)

BARRELS (Fibre)

Benton Fibre Drum Co., 186 Van Dyke St., Bklyn. 31
Bennett Industries, Inc., 122 Washington St., Peotone, Ill.
Carpenter Container Co., 147—41st St., Brooklyn
Continental Can Co., 100 E. 42nd St., N. Y. 17
Federal Fibre Corp., 3704 10th St., L. I. C. 1, N. Y.
Fibre Drum Co., 20 N. Wacker Dr., Chicago 6
Master Package Corp., Owen, Wisc.
Rheem Mfg. Co., 1701 Edgar Rd., W., Linden, N. J.
Seymour & Peck Co., Blue Island, Ill.

BARRELS (Metal)

Bennett Industries, 122 Washington St., Peotone, Ill.
Columbia Can Co., 59-27 54th St., Maspeth 78, N. Y.
Eastern Can Co., Keap St., & Kent Ave., Bklyn.
Inland Steel Container Co., 6532 S. Menard Ave., Chicago
Jones & Laughlin Steel Corp., 3 Gateway Center, Pittsburgh
National Steel Con. Corp., 67000 S. LeClaire, Chicago
Pressed Steel Tank Co., Milwaukee, Wis.
Republic Steel Package Co., 7930 Jones Rd., Cleveland
Rheem Mfg. Co., 1701 Edgar Rd., W., Linden, N. J.
St. Louis Steel Package Co., St. Louis
Terris Div. Consolidated Siphon Supply Co., 22 Wooster St., N. Y.
U. S. Steel Prods. Co., 30 Rockefeller Plaze, N. Y.
Vulcan-Associated Container Co.'s, Birmingham, Ala.
Vulcan Containers Inc., Bellwood, Ill.

BARREL TILTERS

Economy Eng. Co., 2651 W. Van Buren St., Chicago
Formula Floor Products, 99 Frelinghuysen Ave., Newark, N. J.
Morse Mfg. Co., 753 W. Manlius St., E. Syracuse, N. Y.
Multi-Meter Corp., 1635 Coining Dr., Toledo, O.
Terris Div., Consolidated Siphon Supply Co., 22 Wooster St., N. Y.
Paul O. Young Co., Lexington, Pa.

BARRIER CREAMS (see Hand Creams, Protective)

BASE OILS (see Insecticide Oils)

BATH SALTS

A-M-R Chemical Co., 985 E. 35th St., Brooklyn 18
Davies-Young Soap Co., Dayton 1, Ohio
Flam-Haft Laboratories, 8 E. 12th St., N. Y. 3
Hewitt Soap Co., Dayton, O.
Higley Chem. Co., Dubuque, Iowa
Hysan Prods. Co., 930 W. 38th Place, Chicago
Lightfoot Co., 380 Madison Ave., N. Y. C.
Trio Chem. Wks., 341 Scholes St., Brooklyn

BENTONITE

American Colloid Co., 5100 Suffield Ct., Skokie, Ill.
American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
Archer-Daniels-Midland Co., Minneapolis
Chas B. Chrystal Co., 53 Park Pl., N. Y.
Johns-Manville Prods. Corp., 22 E. 40 St., N. Y. 16
Minerals & Chem. Philipp Corp., Menlo Park, N. J.
Robeco Chems., Inc., 23 E. 26 St., N. Y.
L. A. Salomon & Bro., 216 Pearl St., N. Y.
F. E. Schundler & Co., Joliet, Ill.
Tamms Industries, Inc., 228 N. La Salle St., Chicago
United Clay Mines Corp., 101 Oakland St., Trenton, N. J.
Virginia-Carolina Chem. Corp., Richmond, Va.
Charles A. Wagner Co., 4455 N. 6th St., Phila.
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13
Whittaker, Clark & Daniels, 100 Church St., N. Y.

BENZALDEHYDE

Allied Chem. Corp., General Chem. Div., 40 Rector St., N. Y.
Antara Chemicals, 435 Hudson St., N. Y. 14
Aromatic Products, Inc., 235 4th Ave., N. Y. 3
Dodge & Olcott, Inc., 75 9th Ave., N. Y.
Dragoco, Inc., King Rd., Totowa, N. J.
P. R. Dreyer, Inc., 601 W. 26th St., N. Y.
Felton Chemical Co., 603 Johnson Ave., Brooklyn
Florasynth Laboratories, 900 Van Nest Ave., N. Y.
Fitzsche Brothers, Inc., 76 Ninth Ave., N. Y.
Givaudan-Delawanna, Inc., 321 W. 44th St., N. Y.
R. W. Greeff Co., 10 Rockefeller Plaza, N. Y. 20
Heyden Chem. Div., Heyden Newport Chem. Corp., 342 Madison Ave., N. Y.
International Flavors & Fragrances, Inc., 521 W. 57 St., N. Y. C.
Geo. Lueders & Co., 427 Washington Ave., N. Y. 13
Lautier Fils, 321 Fifth Ave., N. Y. 16
Magnus Mabee & Reynard, 16 Desbrosses St., N. Y.
Neumann-Buslee & Wolfe, 5800 Northwest Highway, Chicago
Norda Essential Oil & Chem. Co., 601 W. 21st St., N. Y. 1
Orbis Products Corp., 601 W. 26th St., N. Y.
S. B. Penick & Co., 100 Church St., N. Y. 8
Polak's Frutal Wks., 33 Sprague Ave., Middletown, N. Y.
Rhodia, Inc., 60 E. 56th St., N. Y.
Schimmel & Co., Newburgh, N. Y.
Tombarel Products Corp., 725 Broadway, N. Y. 3
Ungerer & Co., 161 Avenue of the Americas, N. Y.
Van Dyk & Co., Belleville, N. J.
Albert Verley & Co., 1375 E. Linden Ave., Linden, N. J.
Verona Aromatics, 26 Verona Ave., Newark 4, N. J.

BENZOIC ACID

Allied Chem. Corp., General Chem. Div., 40 Rector St., N. Y.
Heyden Chem. Div., Heyden Newport Chem. Corp., 342 Madison Ave., N. Y.
Hooker Chem. Corp., Niagara Falls, N. Y.
Monsanto Chemical Co., St. Louis 24, Mo.
S. B. Penick & Co., NYQ Chem. Div., 100 Church St., N. Y. 8
Robeco Chems., Inc., 23 E. 26th St., N. Y. 10
Tennessee Prods. & Chem. Corp., Nashville, Tenn.

BENZOL (Benzene)

Allied Chem. Corp., Plastics Div., 40 Rector St., N. Y.
American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
Amoco Chems. Corp., 130 E. Randolph Dr., Chicago 1
Amsco Solvents & Chemicals Co., 4619 Reading Road, Cincinnati 29
Buffalo Solvents & Chemicals Corp., Box 73 Station B., Buffalo, N. Y.
Central Solvents & Chemicals Co., 2540 Flournoy St., Chicago 12
Concord Chemical Co., 205 S. 2nd St., Camden, N. J.
Continental Oil Co., 1270 Ave. of Americas, N. Y. 20
Dixie Solvents & Chems. Co., Dixie Highway at Appleton, Louisville
Enjay Chem. Co., 15 W. 51st St., N. Y. 19
Gulf Oil Corp., 360 Lexington Ave., N. Y.
Hoosier Solvents & Chemicals Corp., 1650 Luett Ave., Indianapolis
Inland Steel Co., 30 W. Monroe St., Chicago
Jones & Laughlin Steel Corp., Pittsburgh 30
Koppers Co., Chamber of Commerce Bldg., Pittsburgh
Missouri Solvent & Chemical Co., 419 De Soto Ave., St. Louis
Monsanto Chem. Co., St. Louis, Mo.
Neville Chemical Co., Pittsburgh
Ohio Solvents & Chemicals Co., 3570 W. 140th St., Cleveland
Robeco Chemicals, Inc., 23 E. 26th St., N. Y.
Shell Chemical Corp., 50 W. 50th St., N. Y.
Signal Oil & Gas Co., Houston 12, Tex.
Southern Solvents & Chemicals Corp., 917 Jefferson Highway, New Orleans
Sun Oil Co., 1608 Walnut St., Philadlphia 3
Tenn. Prod. & Chem. Corp., Nashville 3, Tenn.
Texaco, Inc., 135 E. 42 St., N. Y.
Texas Solvents & Chemicals Co., 8501 Market St., Houston
Toledo Sols. & Chems. Co., 4051 South Ave., Toledo, O.
Velsicol Chem. Corp., 330 E. Grand Ave., Chicago
Western Solvents Chemicals Co., 6472 Selkirk Ave., Detroit
Wisconsin Solvents & Chemicals Corp., 1719 S. 82 St., Milwaukee, Wisc.
Wolverine Sols. & Chems. Co., 2940 Stafford Ave., S.W., Grand Rapids

BICARBONATE OF SODA (see Sodium Bicarbonate)

BICHROMATES

Allied Chem. Corp., Solvay Process Div., 61 Broadway, N. Y.
American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Harshaw Chemical Co., 1945 E. 97th St., Cleveland 6
Mallinckrodt Chem. Wks., St. Louis 7
Merck & Co., Rahway, N. J.
Prior Chem. Corp., 420 Lexington Ave., N. Y.
Robeco Chemicals, Inc., 23 E. 26 St., N. Y.
Jos. Turner & Co., Ridgefield, N. J.

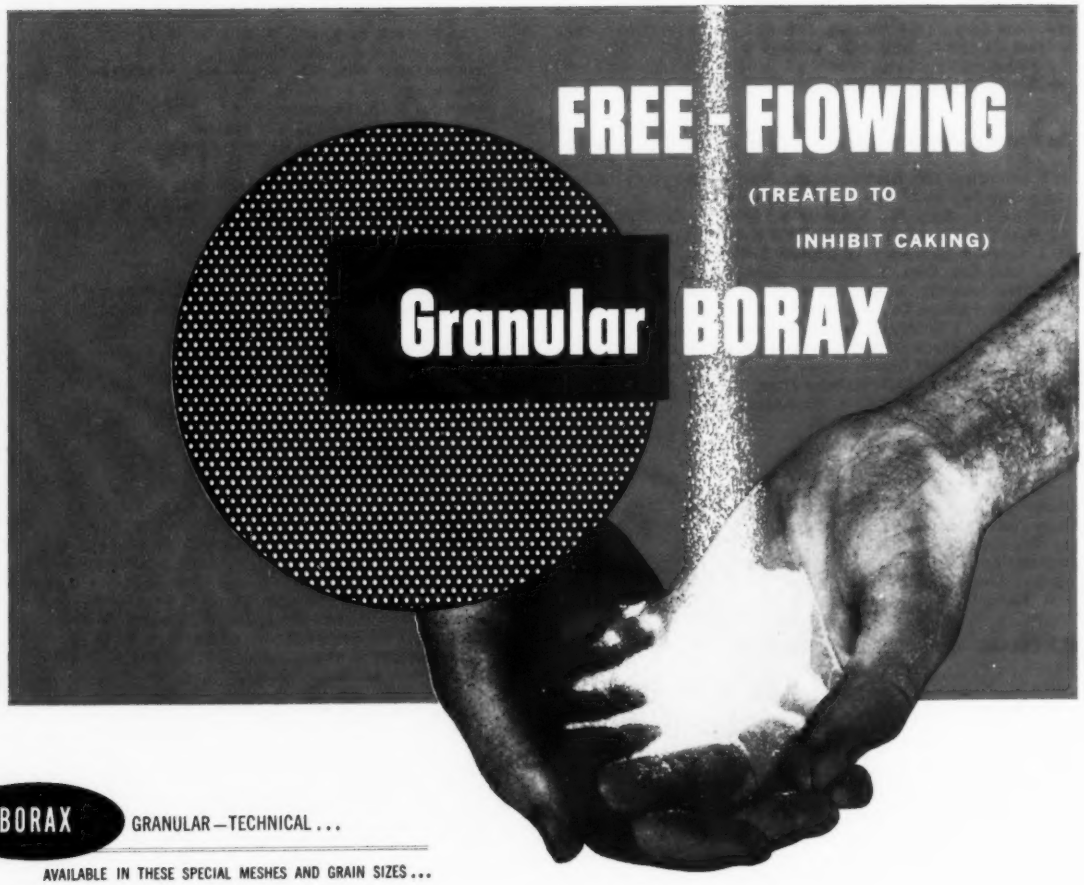
BLEACH, DRY (see Dry Bleach)

BLEACH, LIQUID (see Laundry Bleach)

BLEACHING AGENTS (see Chlorine, Peroxide, etc.)

BLEACHING EARTHS and CARBONS (see also Clays)

Chas. B. Crystal Co., 53 Park Pl., N. Y.
Dicalite Div., 612 S. Flower St., Los Angeles, Calif.



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AVAILABLE IN THESE SPECIAL MESHES AND GRAIN SIZES . . .

Name & Screen Designation	Typical Particle Size Range U. S. Standard Sieve No.		Screen Specification U. S. Standard Sieve No. When Packed	
Granular 8/40 (Special Mesh)	+ 8 + 40	Nil 96.8%	+ 45	min. 95%
Granular 8/60 (Special Mesh)	+ 8 + 60	Nil 80.0%	+ 8 +100	none min. 90%
Granular 30/60 (Special Mesh)	+ 30 + 60	0.5% 69.8%	+ 30 +100	max. 1% min. 80%
Granular 30/70 (Special Mesh)	+ 30 + 70	0.3% 71.0%	+ 30 + 40	max. 1% max. 20%
Granular 30/80 (Special Mesh)	+ 30 + 80	0.8% 76.6%	+ 30	max. 1%
Granular 30/100 (Special Mesh)	+ 30 +100	Nil 86.7%	+ 35 +100	none min. 85%
Granular 40/100 (Special Mesh)	+ 40 +100	Nil 89.0%	+ 40 +100	max. 0.5% min. 88%
Granular 40/140 (Special Mesh)	+ 40 +140	0.1% 88.8%	+ 35 +100	none min. 50%
Granular 40/200 (Special Mesh)	+ 40 +200	0.1% 84.1%	+ 30	none
Granular 60/200 (Special Mesh)	+ 60 +200	0.1% 66.7%	+ 60	max. 1%
Granular 80/200 (Special Mesh)	+ 80 +200	2.0% 67.6%	+ 60 + 80	none max. 5%

Powdered Hand Soaps are better performers when borax is part of their make-up. They work better in any water — cut grease quicker — and feel smoother. Our granular borax is free-flowing and 100% soluble. This material is now available to you in any of the many special uniform meshes listed at left. Samples, bulletins, or technical advice can be obtained from the sales office nearest to you. Write today!

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BLEACHING EARTH and CARBONS (Cont'd.)

Filtrol Corp., 3250 E. Washington Blvd., Los Angeles
Johns-Manville Prods. Corp., 22 E. 40th St., N. Y.
J. M. Huber Corp., 630 3rd Ave., New York
Industrial Chem. Sales Div., 230 Park Ave., N. Y.
Minerals & Chems. Philipp Corp., Menlo Park, N. J.
Tamms Industries, Inc., 228 N. LaSalle St., Chicago
Whittaker, Clark & Daniels, 100 Church St., N. Y.
Witco Chemical Co., 122 E. 42nd St., N. Y.

BLEACHING EQUIPMENT (see Deodorizing and Bleaching Equipment)

BLEACHING POWDER (Chloride of Lime)

Dow Chemical Co., Midland, Mich.
Food Machy. & Chem. Corp., 161 E. 42 St., N. Y. 17
Harshaw Chemical Co., 1945 E. 97th St., Cleveland 6
Monsanto Chemical Co., St. Louis, Mo.
Olin Mathieson Chem. Corp., Ind. Chems., Baltimore 3
Pennsalt Chems. Corp., 3 Penn Center, Phila.
Robeco Chemicals, Inc., 25 E. 26th St., N. Y. 10
Stauffer Chem. Co., 380 Madison Ave., N. Y.
Jos. Turner & Co., Ridgefield, N. J.

BLENDERS (see Mixing Machinery)

BLOCK HOLDERS (see Deodorizing Block Holders)

BLOWERS, ELECTRIC (see Sprayers, Electric)

BLOWERS, FOR POWDERS (see Dusters, Insecticide Powder)

BLUEING (see Laundry Blue)

BOILER COMPOUNDS

American Colloid Co., 5100 Suffield Ct., Skokie, Ill.
Chicago Sanitary Prods. Co., 3100 S. Throop St., Chicago
Dow Chemical Co., Midland, Mich.
Frontier Chem. Prods., Inc., 119 E. Soper St., St. Louis
Geigy Industrial Chemicals, Ardsley, N. Y.
Haag Laboratories, 140th & Seeley, Blue Island, Ill.
Harley Soap Co., Pearce & Orthodox Sts., Phila. 37
R. M. Hollingshead Corp., Camden, N. J.
Industrial Materials Co., 1017 McCall St., Houston
Jefferson Chemical Co., 1121 Walker Ave., Houston, Tex.
Jones-Hamilton Co., 455 Wells Ave., Newark, Calif.
Klix Chem. Co., 551 Railroad Ave., S. San Francisco
Monsanto Chemical Co., St. Louis 24, Mo.
Olin Mathieson Chem. Corp., Ind. Chems., Baltimore 3
Nalco Chem. Co., 6216 W. 66 Pl., Chicago
Peck's Products Co., 610 E. Clarence Ave., St. Louis 15
Pennsalt Chemicals Corp., 3 Penn Center Plaza, Phila.
Permutit Co., 330 W. 42nd St., N. Y.
Rumford Co., Rumford 16, R. I.
S. & S. Soap Co., 815 E. 135th St., N. Y. 54
John T. Stanley Co., 642 W. 30 St., N. Y. 1
Tex-ite Prods. Corp., 859 E. 43 St., Bklyn. 10
Ultra Chem. Wks. P. O. Box 1536, Paterson, N. J.

BORAX (and Boric Acid)

American Potash & Chem. Corp., 3030 W. 6th St., Los Angeles
E. I. du Pont de Nemours & Co., Wilmington, Del.
Harshaw Chemical Co., 1945 E. 97th St., Cleveland
A. R. Maas Chemical Co., 4570 Ardine St., South Gate, Calif.
Pittsburgh Plate Glass Co., 1 Gateway Center, Pittsburgh
Stauffer Chem. Co., 380 Madison Ave., N. Y.
Jos Turner & Co., Ridgefield, N. J.
U. S. Borax & Chem. Corp., 50 Rockefeller Plaza, N. Y. 20
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13

BOTTLE DISPENSERS (see Sprayers, Atomizing)

BOTTLE CLEANING EQUIPMENT

Chisholm-Ryder Co., of Pa., Hanover, Pa.
Emhart Mfg. Co., Portland, Conn.
FMC Packaging Mchy. Div., 4972 Summerdale Ave., Phila., Pa.
Filpaco Industries, 2464 S. Michigan Ave., Chicago
First Machy. Corp., 209 10 St., Bklyn. 15 (used)
Horix Mfg. Co., 2609 Chartiers Ave., Pittsburgh
Island Equip. Corp., 1090 E. 31st St., Hialeah, Fla.
Kartridg Pak Co., 9151 W. Fullerton Ave., Franklin Park, Ill.
Karl Kiefer Machine Co., 919 Martin St., Cincinnati
Laub Engineering Co., 244 N. San Marino Ave., San Gabriel, Calif.
M. R. M. Co., 191 Berry St., Brooklyn
Newman Tallow & Soap Machy. Co., 3601 S. Iron St., Chicago (used)
Packer Mchy. Corp., 109 14th St., Bklyn.
Pneumatic Scale Corp., Quincy 71, Mass.
U. S. Bottlers Mchy. Co., 4019 N. Rockwell St., Chicago
Weigh Right Auto. Scale Co., Mills Rd., Joliet, Ill.

BOTTLE FILLING MACHINERY (see Filling Machinery)

BOTTLE SPRAYERS (See Sprayers, Atomizing)

BOTTLES AND JARS

Armstrong Cork Co., Lancaster, Pa.
Anchor Hocking Glass Corp., Lancaster, Ohio
Ball Brothers Co., Muncie, Ind.
Brockway Glass Co., Brockway, Pa.
Carr-Lowrey Glass Co., 2201 Kloman St., Baltimore 30
Foster-Forbes Glass Co., Marion, Ind.
Hazel-Atlas Glass Division, Wheeling, W. Va.
Knox Glass, Inc., Knox, Pa.
Maryland Glass Co., Baltimore Md.
Metro Glass Co., Jersey City, N. J.
Owens Illinois Glass Co., Toledo, O.
Thatcher Glass Mfg. Co., 375 Park Ave., N. Y. C.
Wheaton Glass Co., Milville, N. J.

BOTTLES, PLASTIC (see Containers, Plastic)

BOX LINERS (see Liners)

BOXES, (Corrugated and Fibre)

Andre Paper Box Co., 1355 Market, St., San Francisco
Atlas-Boxmakers, Inc., 5025 W. 65th St., Chicago
Birmingham Paper Co., 2110 S. 5th Ave., Birmingham, Ala.
Calumet Carton Co., Homewood, Ill.
Cambridge Paper Box Co., Cambridge, Mass.
Container Corp. of Am., 38 S. Dearborn St., Chicago
Continental Can Co., 100 E. 42nd St., N. Y. 17
Essex Paper Box Mfg. Co., 281 Astor St., Newark, N. J.
Fein's Corrugated Containers, 100 Park Ave., N. Y. C.
Fibreboard Paper Prods. Corp., 475 Brannan St., San Francisco
Gaylord Container Corp., 111 N. 4th St., St. Louis 2
Inland Container Division, 111 N. 4 St., St. Louis 2
National Folding Box Co., 405 Lexington Ave., N. Y.
Pacific Paper Box Co., 3615 Broadway Pl., Los Angeles
Union Bag-Camp Corp., 233 Broadway, N. Y.
Stone Container Corp., 4200 W. 42nd Pl., Chgo.

BOXES (Folding)

Ace Carton Co., 5800 W. 51st St., Chicago
Brooks & Porter, Inc., 304 Hudson St., New York
Berles Carton Co., 85 5th Ave., Paterson, N. J.
Bruce Carton Co., 546 Weakley Ave., Memphis, N. J.
Container Corp. of Am., 38 S. Dearborn St., Chicago
Continental Can Co., 100 E. 42nd St., N. Y. 17
Fibreboard Paper Prods. Corp., 475 Brannan St., San Francisco
Gardner Div., Diamond National Corp., 407 Charles St., Middletown, O.
Gaylord Container Corp., 111 N. 4th St., St. Louis
Ohio Boxboard Co., Rittman, O.
Old Dominion Box Co., Lynchburg, Va.
Stone Container Corp., 4200 W. 42nd Pl., Chicago

BOXES (Set-up)

Acme Paper Box Co., 800 Tennessee St., San Francisco
Container Corp. of America, 38 Dearborn St., Chicago
F. N. Burt Co., 500 Seneca St., Buffalo, N. Y.
Dennison Mfg. Co., Framingham, Mass.
Los Angeles Paper Box & Board Mills, 2615 E. 12th St., Los Angeles
Shoup-Owens, Inc., 1100 Adams St., Hoboken, N. J.
Simplex Paper Box Corp., Lancaster, Pa.
Stone Container Corp., 4200 W. 42nd Pl., Chicago
Wallace Paper Box Corp., 52-07 Flushing Ave., Maspeth, N. Y. C.

BROKERS (Chemicals)

American-British Chemical Supplies, 180 Madison Ave., N. Y. 16
John H. Calo Co., 19 Rector St., N. Y. 6

BROKERS (Chemicals) (Cont'd.)

John A. Chew, Inc., 60 E. 42nd St., N. Y.
Fisher Chem. Co., 355 Lexington Ave., N. Y. C.
Globe Chem. Co., Murray Rd., Cincinnati
Griffin Chem. Co., 1000 16th St., San Francisco
Otto A. C. Hagen Co., Public Ledger Bldg., Phila.
C. Lievense, 11 Broadway, N. Y. 4
P. J. Lo Bue Co., 277 Park Ave., N. Y.
Millmaster Chem. Corp., 99 Park Ave., N. Y.
Pasternack & Co., 92 Liberty St., N. Y.
Revere Oil & Chemical Co., 60 E. 42 St., N. Y.
Riches-Nelson, Inc., 342 Madison Ave., N. Y.
G. S. Robins & Co., 126 Chouteau Ave., St. Louis 2
Robeco Chems. Inc., 23 E. 26th St., N. Y.
George Uhe Inc., 76 9th Ave., N. Y.
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13

BROKERS (Oils and Fats)

Irving R. Boody Co., 42 Broadway, N. Y.
John H. Calo Co., 19 Rector St., N. Y. 6
Davidson Commission Co., 327 S. La Salle St., Chicago
John W. Hall, 327 S. La Salle St., Chicago
Otto A. C. Hagan Co., Public Ledger Bldg., Phila.
Hasselman, Seaman, de Ryss, Inc., 347 Madison Ave., N. Y.
Hentz & Co., 72 Wall St., N. Y.
Hollingshead & Co., 60 E. 42 St., N. Y.
E. G. James Co., 316 S. La Salle St., Chicago
Marwood Co., 221 N. LaSalle, Chicago
Miller & Co., 2401 Chestnut St., Philadelphia
Rayner & Stonington, Inc., 76 Beaver St., N. Y.
Revere Oil & Chemical Co., 60 E. 42 St., N. Y.
Robeco Chems., Inc., 23 E. 26th St., N. Y.
Sterne & Son Co., Board of Trade Bldg., Chicago
Weaver & Hugi, Inc., 44 Whitehall St., N. Y.
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13

BUTANE

Matheson Co., East Rutherford, N. J.
Cities Service Oil Co., Bartlesville, Okla.
Phillips Petroleum Co., Bartlesville, Okla.

BUTONATE

Prentiss Drug & Chem. Co., 101 W. 31 St., N. Y.

CALCIUM CARBONATE (see Chalk)

CALCIUM CHLORIDE

Allied Chem. Corp., Solvay Process Div., 61 Broadway, N. Y.
Dow Chemical Co., Midland, Mich.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Pittsburgh Plate Glass Co., 1 Gateway Center, Pittsburgh
Robeco Chemicals, Inc., 25 E. 26th St., N. Y.
Jos. Turner & Co., Ridgefield, N. J.
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13
Wyandotte Chemicals Corp., Mich. Alkali Div., Wyandotte, Mich.

CALCIUM HYPOCHLORITE

Allied Chem. Corp., General Chem. Div., 40 Rector St., N. Y.
Harshaw Chemical Co., 1945 E. 97th St., Cleveland 6
Monsanto Chemical Co., St. Louis, Mo.
Olin Mathieson Chem. Corp., Ind. Chems., Baltimore 3
Pennsalt Chems. Corp., 3 Penn Center Plaza, Phila.
Pittsburgh Plate Glass Co., 1 Gateway Center, Pittsburgh
Robeco Chemicals, Inc., 25 E. 26th St., N. Y.
Virginia-Carolina Chem. Corp., Richmond, Va.

CALCIUM STEARATE (see Stearates)

CAMPHOR OIL (see Essential Oils)

CANDELILLA WAX (see Waxes)

CANS (Aluminum)

American Can Co., 100 Park Ave., N. Y.
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Continental's improved aerosol can REALLY takes pressure — more than any other 3-piece can being manufactured. The can's unique pressure tab side seam, together with Continental's improved solder method, form the greatest bond stability available.

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Southern Division: 905 Florida Ave., Tampa 2
Pacific Division: Russ Building, San Francisco 4
Canadian Division: 790 Bay Street, Toronto 1
Overseas Division: 530 Fifth Ave., New York 36

CANS (Aluminum) (Cont'd.)

Crown Cork & Seal Co., 9300 Ashton Rd., Philadelphia, Pa.
Impact Container Corp., Walden Ave., Alden, N. Y.
Metal Fabrications, Inc., 203 Cherry St., Waterbury, Conn.
National Can Corp., 3217 W. 47 Pl., Chicago
U. S. Can Corp., Newport, Ark.
U. S. Hoffman Can Corp., 50 St. & Ist Ave., Bklyn.

CANS (Fibre or Paper)

American Can Co., 100 Park Ave., N. Y.
Benton Fibre Drum Co., 186 Van Dyke St., Bklyn. 31
Cin-Made Corp., 800 E. Ross Ave., Cincinnati
Cleveland Container Co., 3571 W. 62 St., Cleveland
Continental Can Co., 100 E. 42nd St., N. Y.
Cross Paper Products Corp., 4377 Bronx Blvd., N. Y. 66
Fibreboard Paper Prods. Corp., 475 Brannan St., San Francisco 19
Harcord Mfg. Co., 125 Monitor St., Jersey City, N. J.
National Paper Can Co., Cudahy, Wis.
R. C. Can Co., 9430 Page Ave., St. Louis
Sealright Co., Fulton, N. Y.
Stone Container Corp., 4200 W. 42nd Pl., Chgo.
Sutherland Paper Co., Kalamazoo, Mich.

CANS (Friction and Screw Top, Slip Cover, etc.)

American Can Co., 100 Park Ave., N. Y.
Bombrini Parodi-Delfino, Via Lombardia 31, Rome, Italy
Central Can Co., 3200 S. Kilbourn Ave., Chicago
J. L. Clark Mfg. Co., 2300 6th St., Rockford, Ill.
Continental Can Co., Inc., 100 E. 42nd St., N. Y.
Crown Cork & Seal Co., 9300 Ashton Rd., Philadelphia
Eastern Can Co., Keap St. & Kent Ave., Brooklyn 11
Ellisco, Inc., 4008 North American St., Phila. 40
Geuder, Paeschke & Frey Co., 324 N. 15th St., Milwaukee, Wisc.
Heekin Can Co., 429 New St., Cincinnati 2
Impact Container Corp., Walden Ave., Alden, N. Y.
Inland Steel Container Co., 30 W. Monroe St., Chicago
National Can Corp., 3217 W. 47th Pl., Chicago 32
Metal Fabrications, Inc., 203 Cherry St., Waterbury, Conn.
Olive Can Co., 4700 N. Oketo Ave., Chicago
Rose Container Corp., Foot of East 46 St., Bayonne, N. J.
Scovill Mfg. Co., Waterbury, Conn.
Stern Can Co., 71 Locust St., Boston 25
U. S. Hoffman Can Corp., 50 St. & 1 Ave., Brooklyn
Vulcan-Associated Containers, P.O. Box 1510, Birmingham, Ala.
Vulcan Containers Inc., Bellwood, Ill.

CAN SPOUTS AND NOZZLES

American Can Co., 100 Park Ave., N. Y. 17
Am. Flange & Mfg. Co., 30 Rockefeller Plaza, N. Y.
Continental Can Co., 100 E. 42nd St., N. Y. 17
Eastern Can Co., Keap St., & Kent Ave., Bklyn.
Ellisco, Inc., 4008 North American St., Phila. 40
Multi-Meter Corp., 1635 Coining Dr., Toledo, O.
National Can Corp., 3217 W. 47 Pl., Chicago
Rieke Metal Products Corp., Auburn, Indiana
Seal Spout Corp., 230 Sheffield Ave., Mountainside, N. J.
Standard Containers, Inc., Montclair, N. J.
U. S. Hoffman Can Corp., 50 St. & Ist Ave., Bklyn.
Vulcan-Associated Containers, P. O. Box 1510, Birmingham, Ala.
Vulcan Containers Inc., Bellwood, Ill.
Z & W Mfg. Corp., 30240 Lakeland Blvd., Wickliffe, O.

CANS, SPECIALTY METAL (see Containers, Specialty Metal)

CANS (Sifter Top)

American Can Co., 100 Park Ave., N. Y. 17
Cin-Made Corp., 880 E. Ross Ave., Cincinnati
J. L. Clark Ffg. Co., 2300 6th St., Rockford, Ill.
Cleveland Container Co., 3571 W. 62 St., Cleveland
Continental Can Co., Inc., 100 E. 42nd St., N. Y.
Cross Paper Products Corp., 4377 Bronx Blvd., N. Y. 66
Eastern Can Co., Keap St. & Kent Ave., Bklyn.
Fibreboard Paper Prods. Corp., 475 Brannan St., San Francisco 19
Harcord Mfg. Co., 125 Monitor St., Jersey City, N. J.
National Can Corp., 3217 W. 47 Pl., Chicago
R. C. Can Co., 9430 Page Ave., St. Louis
Scovill Mfg. Co., Waterbury, Conn.

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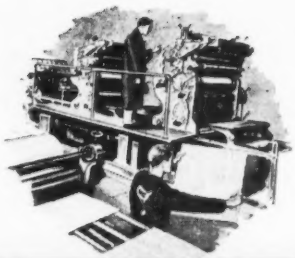

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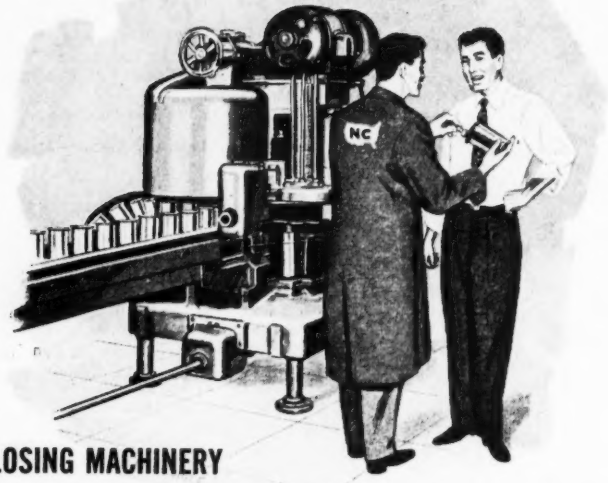

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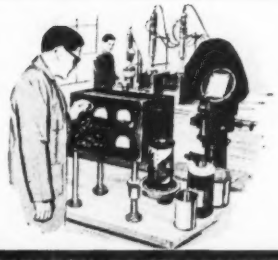

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CANS (Sifter Top) (Cont'd.)

Sefton Fibre Can Co., 3275 Big Bend Blvd., St. Louis
Stone Container Corp., 4200 W. 42nd Pl., Chgo.

CAP LINERS

Aluminum Prods. Corp., Fulton, N. Y.
Armstrong Cork Co., Lancaster, Pa.
Bernardin Bottle Cap Co., 2201 W. Maryland St., Evansville, Ind.
Walter Frank Organization, 4100 Warren Ave., Hillside, Ill.
General Felt Prods., 68 35th St., Bklyn.
Irvington Varnish & Insulator Co., Irvington, N. J.
Reynolds Metals Co., Richmond, Va.

CAPPING MACHINERY

Anchor Hocking Glass Corp., Lancaster, O.
Builders Sheet Metal Wks., 108 Wooster St., N. Y.
Consolidated Packaging Machinery Corp., 1400 West Ave., Buffalo
Crown Cork & Seal Co., 9300 Ashton Rd., Phila. 36
Emhart Mfg. Co., Portland, Conn.
Ertel Engineering Corp., West Front St., Kingston, N. Y.
FMC Packaging Mchy. Div., 4972 Summerdale Ave., Phila., Pa.
Filpaco Industries, 2464 S. Michigan Ave., Chicago
First Machy. Corp., 209 10 St., Bklyn. 15 (used)
R. G. Haskins Co., 2661 W. Harrison St., Chicago
Laub Engineering Co., 244 N. San Marino Ave., San Gabriel, Calif.
M. R. M. Co., 191 Berry St., Brooklyn
Newman Tallow & Soap Machy. Co., 3601 S. Iron St., Chicago
PMC Industries, 293 Hudson St., Hackensack, N. J.
Pneumatic Scale Corp., Quincy 71, Mass.
Resina Automatic Mchy. Co., 572 Smith St., Brooklyn
W. H. Swanson & Co., 1413 Lake Ave., Wilmette, Ill.
Triangle Package Machy. Co., 6643 W. Diversey Blvd., Chicago 51
Tite-Cap Machine Co., 57 Rose St., N. Y. 7
U. S. Bottlers Mchy. Co., 4015 N. Rockwell S., Chicago

CAPS, (Captive Flip)

American Can Co., 100 Park Ave., N. Y. C.
Continental Can Co., 100 E. 42nd St., N. Y. C. 17

CAPS, PLASTIC

American Can Co., 100 Park Ave., N. Y. 17
Anchor Hocking Glass Corp., Lancaster, Ohio
Armstrong Cork Co., Lancaster, Pa.
Bernardin Bottle Cap Co., 2201 W. Maryland St., Evansville, Ind.
Bombrini Parodi-Delfino, Via Lombardia 31, Rome, Italy
Buckeye Molding Co., Miamisburg, O.
Continental Can Co., 100 E. 42 St., N. Y. 17
Federal Tool Corp., 3600 W. Pratt Blvd., Chicago
Clayton Corp., 4205 Forest Park Blvd., St. Louis 8
J. L. Clark Mfg. Co., 2300 6th St., Rockford, Ill.
Walter Frank Organization, 4100 Warren Ave., Hillside, N. J.
General Plastics, Inc., N. Tonawanda, N. Y.
Gibbs Automatic Molding Corp., Hendersonville, Ky.
Gibson Associates, 390 E. North Ave., Cranford, N. J.
Gilbert Plastics, Inc., Boright Ave., Kenilworth, N. J.
Mack Molding Co., Wayne, N. J.
Multi-Meter Corp., 1635 Coining Dr., Toledo, O.
Owens-Illinois Glass Co., Toledo, Ohio
Plax Corp., P.O. Box 1019, Hartford, Conn.
Scott Plastics, 410 Windsor St., Hartford, Conn.
Standard Cap & Molding Co., 307 S. Eaton St., Baltimore
Wheeling Stamping Co., 2116 Water St., Wheeling, W. V.
A. H. Wirz, Inc., Chester, Pa.

CAPS, METAL

Aluminum Co. of America, Gulf Bldg., Pittsburgh
American Can Co., 100 Park Avenue, N. Y. 17
Anchor Hocking Glass Corp., Lancaster, Ohio
Armstrong Cork Co., Lancaster, Pa.
Ball Brothers Co., Muncie, Ind.
Bernardin Bottle Cap Co., 2201 W. Maryland St., Evansville, Ind.
J. L. Clark Mfg. Co., 2300 6th St., Rockford, Ill.
Continental Can Co., 100 E. 42nd St., N. Y.
Crown Cork & Seal Co., 9300 Ashton Rd., Phila.
Eastern Cap & Closure Co., 726 N. Kresson St., Baltimore
Walter Frank Organization, 4100 Warren Ave., Hillside, N. J.
Hazel-Atlas Division, Wheeling, W. Va.
Ludwig Closures, 185 Oakland St., Brooklyn
Metal Fabrications, Inc., 203 Cherry St., Waterbury, Conn.
National Seal Co., 14th Ave. & 37th St., Brooklyn
Owens-Illinois Glass Co., Toledo, Ohio
Penn Cap & Closures, 1155 Manhattan Ave., Brooklyn
Phoenix Metal Cap Co., 2444 W. 16th St., Chicago
Rieke Metal Prods. Co., Auburn, Ind.
Seal-Spout Corp., 230 Sheffield St., Mountainside, N. J.
Sterling Seal Co., 316 W. 16th St., Erie, Pa.
West Penn Mfg. & Supply Corp., Brackenridge, Pa.

CAR WASHES

Chemical Service of Baltimore, Howard & Wests Sts., Baltimore
Clarkson Laboratories, 1450 Terry Ave., Camden, N. J.
Concord Chem. Co., 205 S. 2nd St., Camden, N. J.
Frontier Chem. Prods. Inc., 110 E. Soper St., St. Louis
Fuld Bros., 702 S. Wolfe St., Baltimore Md.
Help Inc., 122 W. Kinzie St., Chicago
Hysan Products Co., 919 W. 38 Pl., Chicago
Lestoil, Inc., 51 Garfield St., Holyoke, Mass.
G. H. Packwood Mfg. Co., 1545 Tower Grove Ave., St. Louis
Peck's Products Co., 610 E. Clarence Ave., St. Louis
Uncle Sam Chem. Co., 577 W. 131 St., N. Y.
Utility Chem. Co., 145 Peel St., Paterson, N. J.

CARBOLIC ACID (see Phenol)

CARBON for bleaching oils, glycerine, etc., (see Decolorizing Carbons)

CARBON TETRACHLORIDE

Allied Chem. Corp., Solvay Process Div., 61 Broadway, N. Y.
American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
Amsco Solvents & Chemicals Co., 4619 Reading Road, Cincinnati 29.
J. T. Baker Chemical Co., Phillipsburg, N. J.
Buffalo Solvents & Chemicals Corp., Box 73 Station B, Buffalo 7, N. Y.
Central Solvents & Chemicals Co., 2540 W. Flournoy St., Chicago 12
Diamond Alkali Co., Union Commerce Bldg., Cleveland
Dixie Solvents & Chems. Co., Dixie Highway, Louisville, Ky.
Dow Chemical Co., Midland, Mich.
Food Machy. & Chem. Corp., 161 E. 42 St., N. Y.
Frontier Chemical Co., Wichita, Kan.
C. P. Hall Co., 414 S. Broadway, Akron
Hoosier Solvents & Chemicals Corp., 1650 Luett Ave., Indianapolis 22
Millmaster Chem. Corp., 99 Park Ave., N. Y. 16
Missouri Solvents & Chemicals Co., 419 De Soto Ave., St. Louis 7, Mo.
Ohio Solvents & Chemicals Co., 3470 W. 140th St., Cleveland 11, Ohio
Pennsalt Chems. Corp., 3 Penn Center Plaza, Phila.
Robeco Chemicals, Inc., 25 E. 26th St., N. Y.
Southern Solvents & Chemicals Corp., 917 Jefferson Highway, New Orleans 18, La.
Stauffer Chem. Co., 380 Madison Ave., N. Y.
Jos Turner & Co., Ridgefield, N. J.
Texas Solvents & Chemicals Co., 8501 Market St., Houston 15, Texas
Toledo Sols. & Chems. Co., 4051 South Ave., Toledo, O.
Virginia-Carolina Chem. Corp., Richmond, Va.
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13
Western Solvents & Chemicals Co., 6472 Selkirk Ave., Detroit 11
Wisconsin Sols. & Chems. Corp., 1719 S. 83rd St., Milwaukee
Wolverine Solv. & Chems. Co., 2940 Stafford Ave., SW, Grand Rapids

CARBOXYMETHYCELLULOSE (CMC)

Antara Chemicals, 435 Hudson St., N. Y. 14
E. I. du Pont de Nemours & Co., Wilmington, Del.
Hercules Powder Co., 961 Market St., Wilmington, Del.
Wyandotte Chemicals Corp., Mich. Alkali Div., Wyandotte, Mich.

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CARTON LINING MACHINES (see Lining Machinery)

CARTON SEALING MACHINERY (see Sealing Machinery)

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Bartelt Engineering Co., 1900 Harrison Ave., Rockford, Ill.
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NEW CAUSTIC SODA DRUMS • You don't need a tool kit to open Hooker's new flake caustic soda drums. They flip open, empty easier . . . because the drums have *full* open heads—21 inches across.

The wider mouth also makes the drums more adaptable to re-use.

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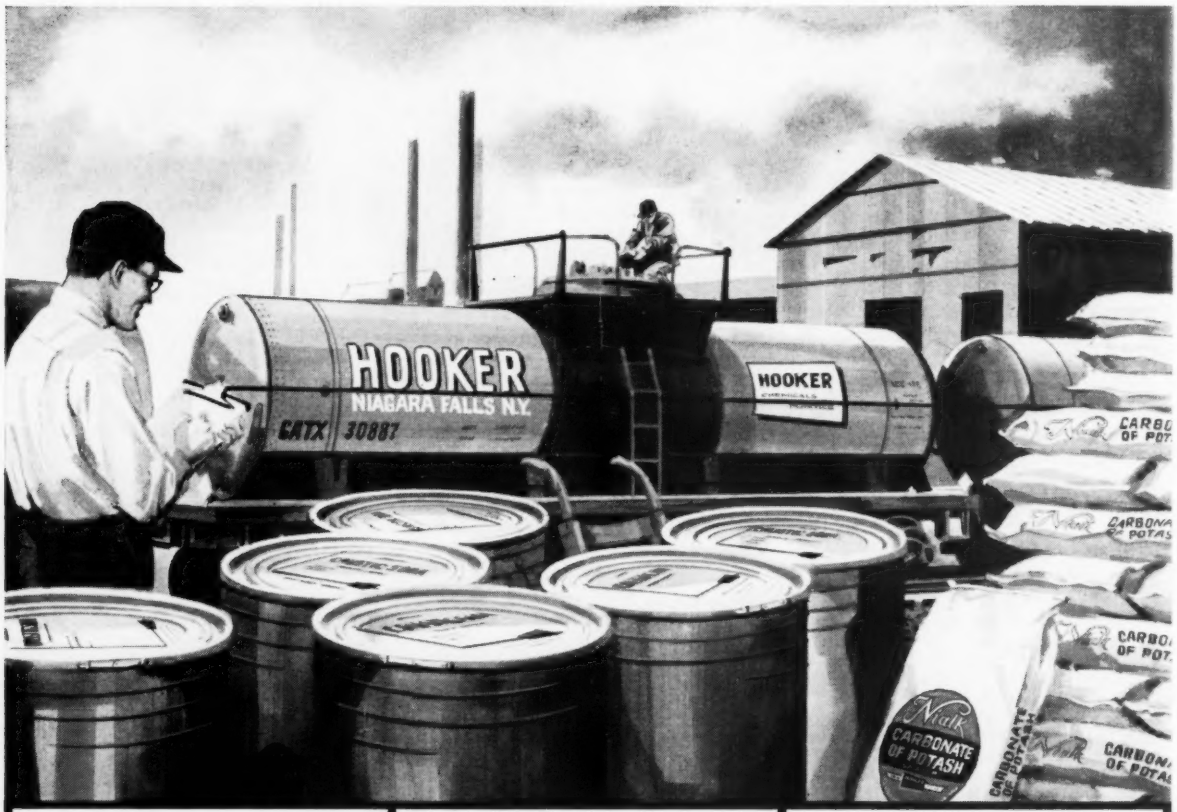

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Solid
Regular Flake
Crystal Flake
Fine Flake
Phosphated
Special Alkali

Liquid forms available in tank cars and tank trucks, dry forms in drums.

CAUSTIC POTASH

Standard Grades
Liquid 45-52%
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Solid 85%
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Hydrate, Regular 83.5-84.0%
Calcined, Regular 99.2-99.6%
Calcined, Regular Powder 99%
Fine, Medium and Coarse
Calcined, Powder 91-94%
Liquid 47-52%

Liquid form available in tank cars and tank trucks, dry forms in wooden barrels, fiber kegs, and paper bags.

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J. L. Ferguson Co., Joliet, Ill.
R. A. Jones & Co., Box 485, Cincinnati, Ohio
Laub Engineering Co., 244 N. San Marino Ave., San Gabriel, Calif.
G. Mazzoni, Busto Arsizio, Italy
John R. Nalbach Eng. Co., 6139 W. Ogden Ave., Chicago
National Equipment Co., 153 Crosby St., N. Y. 12
Newman Tallow & Soap Machy. Co., 1051 W. 35th St., Chicago (Used)
Packaging Machinery Co., East Longmeadow, Mass.
Pneumatic Scale Corp., Quincy 71, Mass.
F. B. Redington Co., 3000 St. Charles Rd., Bellwood, Ill.
Triangle Package Machinery Co., 6633 W. Diversey Blvd., Chicago 51
Weigh Right Automatic Scale Co., Mills Rd., Joilet, Ill.

CARTONS (see Boxes)

CASE LOADING MACHINERY

Chisholm-Ryder Co., Hanover, Penna.
Crompton & Knowles Packaging Corp., Berkshire St., Holyoke, Mass.
Emhart Mfg. Co., Portland, Conn.
FMC Packaging Mchy. Div., 4972 Summerdale Ave., Phila., Pa.
J. L. Ferguson Co., Joliet, Ill.
R. A. Jones & Co., Box 485, Cincinnati
Karl Kiefer Mach. Co., 919 Martin St., Cincinnati
Laub Engineering Co., 244 N. San Marino Ave., San Gabriel, Calif.
Newman Tallow & Soap Machy. Co., 3601 S. Iron St., Chicago (Used)
PMC Industries, 293 Hudson St., Hackensack, N. J.
Pneumatic Scale Corp., Quincy 71, Mass.

CASE SEALING MACHINERY (see Sealing Machinery)

CASEIN

Alco Oil & Chem. Corp., Trenton Ave. & Williams St., Phila.
Borden Co., 350 Madison Ave., N. Y.
Wm. Diehl & Co., 120 E. 56 St., N. Y. 22
E. I. du Pont de Nemours & Co., Wilmington, Del.
F. H. Paul & Stein Bros., 235 5 Ave., N. Y.
Swift & Co., Chicago 9
Tamms Industries, Inc., 228 N. La Salle St., Chicago

CASES (See Boxes, Corrugated)

CASTOR OIL

Archer-Daniels-Midland Co., Minneapolis
Baker Castor Oil Co., 40 Ave. A, Bayonne, N. J.
George Degen & Co., 21 West St., N. Y.
Otto A. C. Hagen Co., 929 Public Leadger Bldg., Phila.
Pacific Vegetable Oil Corp., 1145 S. 10th St., Richmond, Calif
J. H. Redding, Inc., 17 Battery Place, N. Y.
Robeco Chemicals, Inc., 23 E. 26th St., N. Y.
Arthur C. Trask Co., 4103 S. La Salle St., Chicago
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13
Woburn Chem. Corp., 1200 Harrison Ave., Kearny, N. J.

CASTOR OIL, DEHYDRATED

Baker Castor Oil Co., 40 Ave. A, Bayonne, N. J.
Spencer Kellogg & Sons, Buffalo, N. Y.
Pacific Vegetable Oil Corp., 1145 S. 10 St., Richmond, Calif.
Joseph Turner & Co., Ridgefield, N. J.
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13
Woburn Chemical Corp., 1200 Harrison Ave., Kearny, N. J.

CASTOR OIL FATTY ACIDS

Archer-Daniels-Midland Co., Minneapolis 2, Minn.
Armour Industrial Chem. Co., 110 N. Wacker Dr., Chicago
Emery Industries, Carew Tower, Cincinnati
E. F. Drew & Co., 15 E. 26 St., N. Y. 10
A. Gross & Co., 295 Madison Ave., N. Y. 17
Harchem Div., 25 Main St., Belleville 9, N. J.
Swift & Co., Hammond, Ind.
Joseph Turner & Co., Ridgefield, N. J.
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13
Wilson-Martin Div., Snyder Ave. & Swanson St., Phila.
Woburn Chemical Corp., 1200 Harrison Ave., Kearny, N. J.

CASTOR OIL, HYDROGENATED

Amato Agency, Inc., 11 Broadway, N. Y. 4
Archer-Daniels-Midland Co., Minneapolis, Minn.
Armour Industrial Chem. Co., 110 N. Wacker Dr., Chicago
Baker Castor Oil Co., 40 Ave. A, Bayonne, N. J.
E. F. Drew & Co., 15 E. 26 St., N. Y. 10
Eastern Industries, Ridgefield, N. J.
Emery Industries, Carew Tower, Cincinnati
Harchem Div., 25 Main St., Belleville 9, N. J.
Lever Bros. Co., 390 Park Ave., N. Y. 22
M. Michel & Co., 90 Broad St., N. Y. 4
Procter & Gamble Dist. Co., Cincinnati
Swift & Co., Hammond, Ind.
Vegetable Oil Prods., 5568 E. 51 St., Los Angeles
Woburn Chem. Corp., 1200 Harrison Ave., Kearny, N. J.

CATALYTIC AGENTS

American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
Armour Industrial Chem. Co., 110 N. Wacker Dr., Chicago
J. T. Baker Chemical Co., Phillipsburg, N. J.
Continental Chem. Co., 195 21 Ave., Paterson, N. J.
Davison Chemical Corp., Baltimore, Md.
E. F. Drew & Co., 15 E. 26 St., N. Y. 10
Food Machy. & Chem. Corp., 161 E. 42 St., N. Y. 17
Geigy Industrial Chemicals, Ardsley, N. J.
Harshaw Chemical Co., 1945 E. 97th St., Cleveland 6
Heyden Chem. Div., Heyden Newport Chem. Corp., 342 Madison Ave., N. Y.
Hooker Chemical Corp., Niagara Falls, N. Y.
Johns-Manville Prods. Corp., 22 E. 40 St., N. Y.
Lucidol Div., Buffalo 5, N. Y.
Metal & Thermit Corp., Rahway, N. J.
Olin Mathieson Chem. Corp., Ind. Chems., Baltimore 3
Refined Prods. Co., 624 Schuyler Ave., Lyndhurst, N. J.
Stauffer Chem. Co., 380 Madison Ave., N. Y. 17
Witco Chem. Co., 122 E. 42 St., N. Y. 17

CATTLE DIPS AND SPRAYS

ABC Compounding Co., Oakcliff & Harwell Rds., SW., Atlanta, Ga.
Baird & McGuire, Inc., Holbrook, Mass.
Barnett Chemical Products Co., 326 Lafayette Bldg., Phila. 6
California Spray-Chemical Corp., Richmond, Calif.
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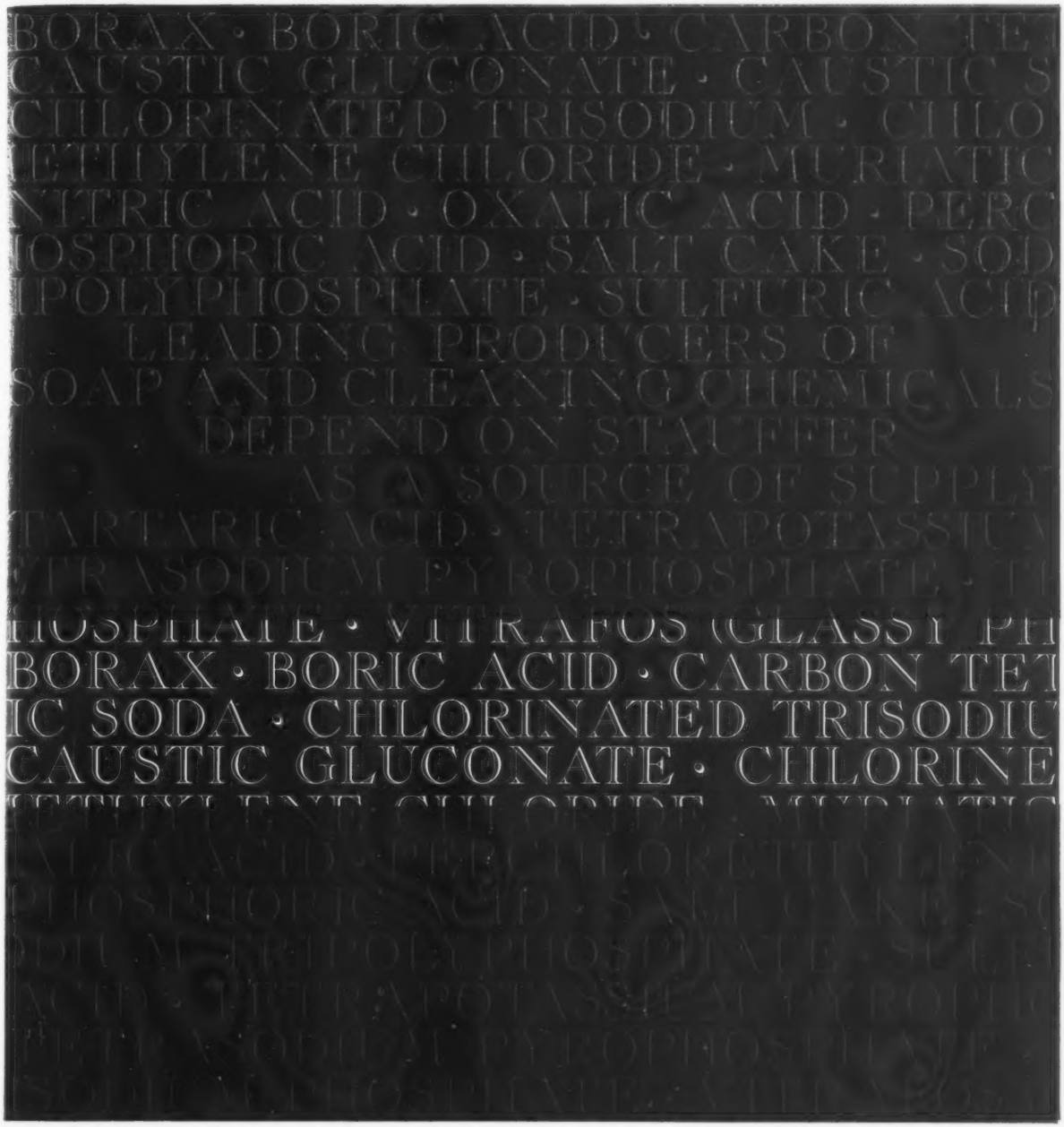
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Geigy Industrial Chemicals, Ardsley, N. Y.
Gaylord Chem. Co., 701 Woodsweather Rd., Kansas City
James Good, Inc., 2107 Susquehanna Ave., Phila.
Harley Soap Co., Pearce & Orthodox Sts., Phila. 37
Help, Inc., 122 W. Kinzie St., Chicago
Higley Chemical Co., Dubuque, Iowa
R. M. Hollingshead Corp., Camden, N. J.
Hunt Mfg. Co., Lisbon Rd., Cleveland
Hysan Prods. Co., 930 W. 38th Place, Chicago
Industrial Materials Co., 1017 McCall St., Houston
J. Chemical Works Co., 602 W. 37th St., N. Y. 18
Jones-Hamilton Co., 455 Wells Ave., Newark, Calif.
Kamen Soap Prods. Co., 5-22 50 Ave., L. I. C., N. Y.
Kemiko Mfg. Co., 500 Chancellor Ave., Irvington, N. J.
Klix Chem. Co., 551 Railroad Ave., South San Francisco, Calif.
H. Kohnstamm & Co., 161 6th Ave., N. Y.
Los Angeles Soap Co., Los Angeles, Calif.
M. Michel & Co., 90 Broad St., N. Y.
Midland Labs., Dubuque, Iowa
National Milling & Chem. Co., 4601 Flat Rock Rd., Phila. 27
National Research & Chem. Co., 12520 Cerise Ave., Hawthorne, Calif.
North Coast Soap & Chem. Wks., Seattle, Wash.
Onyx Chemical Corp., Warren & Morris Sts., Jersey City, N. J.
G. H. Packwood Mfg. Co., 1545 Tower Grove Ave., St. Louis 10
J. C. Paul & Co., 8140 N. Ridgeway Ave., Skokie, Ill.
Peck's Prod. Co., 610 E. Clarence Ave., St. Louis
Peerless Chem. Co., 1300-02 N. Fulton Ave., Baltimore
Pennsalt Chems. Corp., 3 Penn Center Plaza, Phila.
Philadelphia Quartz Co., Public Ledger Bldg., Independence Sq., Phila. 6
Pilot Chemical Co., 11756 Burke St., Santa Fee Springs, Calif.
Pittsburgh Plate Glass Co., 1 Gateway Center, Pittsburgh
Port Huron Detergent Co., Port Huron, Mich.
Procter & Gamble Distributing Co., Cincinnati
Puro Co., 2801 Locust St., St. Louis, Mo.
Purex Corp., Industrial Div., P.O. Box 9636, Phila. 31
Rumford Chem. Wks., Rumford 16, R. I.
Sanders Chem. Co., 2205 N. American St., Phila. 33
S. & S. Soap Co., 815 E. 13th St., N. Y. 54
Southern Chemical Prods. Co., 170 Poplar St., Macon, Ga.
Stanalchem Inc., 350 Madison Ave., N.Y. 17
John T. Stanley Co., 642 W. 30th St., N. Y.
Sugar Beet Prods. Co., Saginaw, Mich.
Swift & Co., Chicago 9
Tesco Chemicals, Inc., Atlanta 5, Ga.

CLEANING COMPOUNDS, DRY (Cont'd.)

Tex-ite Prods. Corp., 859 E. 43 St., Brooklyn 10
Thompson-Hayward Chem. Co., 2915 Southwest Blvd., Kansas City, Mo.
Treplow Chemical Co., 59 Camden St., Paterson, N. J.
Trio Chem. Wks., 341 Scholes St., Bklyn.
Ultra Chem. Wks., 2 Wood St., Paterson, N. J.
Uncle Sam Chem. Co., 573 W. 131st St., N. Y.
U. S. Sanitary Spec. Corp., 1001 S. California Blvd., Chicago 12
James Varley & Sons, 1200 Switzer Ave., St. Louis
Virginia-Carolina Chem. Corp., Richmond 5, Va.
Wyandotte Chemicals Corp., J. B. Ford Div., Wyandotte, Mich.

CLEANING FLUIDS (Spotting Fluids)

Amoco Chems. Corp., 130 E. Randolph Dr., Chicago
A-M-R Chemical Co., 985 E. 35th St., Brooklyn 18
Amsco Solvents & Chems. Co., 4617 Reading Rd., Cincinnati
Atlantic Refining Co., 260 South Broad St., Phila.
C. P. Baker & Co., 501 N. 11th St., Phila. 23
B & W Chemical Co., 25920 Belle Porte, Harbor City, Calif.
Baums Castorine Co., 200 Mathew St., Rome, N. Y.
Britex Corp., 17-18 Lewis Wharf, Boston 10
Buckingham Wax Co., 51-03 Van Dam St., L. I. C., N. Y.
Buffalo Solvents & Chem. Corp., P. O. #73, Sta. B, Buffalo, N. Y.
Central Solv. & Chem. Co., 2540 W. Flournoy St., Chicago
Chem. Compounding Corp., 262 Huron St., Bklyn.
Chicago Sanitary Prods. Co., 3100 S. Throop St., Chicago
Concord Chem. Co., 205 S. 2 St., Camden, N. J.
Davies-Young Soap Co., Dayton, O.
Dixie Solvents & Chems. Co., Dixie Highway, Louisville
Dow Chem. Co., Midland, Mich.
E. I. du Pont de Nemours & Co., Wilmington
Emkay Chemical Co., Elizabeth 1, N. J.
Fuld Bros., 702 S. Wolfe St., Baltimore 31
Fine Organics, Inc., 205 Main St., Lodi, N. J.
Help, Inc., 122 W. Kinzie St., Chicago
Higley Chem. Co., Dubuque, Iowa
R. M. Hollingshead Corp., Camden, N. J.
Hoosier Sols. & Chem. Corp., 1650 Luett Ave., Indianapolis
James Huggins & Son, 239 Medford St., Malden, Mass.
Hysan Prods. Co., 930 W. 38th Place, Chicago
Jefferson Chem. Co., 1121 Walker Ave., Houston, Tex.
Kaysing Corp., 8005 Alabama, St. Louis 11
Klix Chemical Co., 551 Railroad Ave., S. San Francisco
Missouri Sols. & Chems. Co., 419 DeSoto Ave., St. Louis
Peck's Prods. Co., 610 E. Clarence Ave., St. Louis
Puro Co., 2801 Locust St., St. Louis 3
Ohio Sols. & Chems. Co., 3470 W. 140th St., Cleveland
Pennsalt Chems. Corp., 3 Penn Center, Phila. 2
Pennsylvania Refining Co., Butler, Pa.
Products Packaging, Inc., 6400 Herman Ave., Cleveland 2
Sandoz Inc., 61 Van Dam St., N. Y. 13
Signal Oil & Gas Co., Houston 12, Tex.
Sonneborn Chemical & Refining Corp., 300 4th Ave., N. Y. 10
Southern Sols. & Chems. Corp., 917 Jefferson Hgwy., New Orleans
Standard Oil Co., (Calif.), 225 Bush St., San Francisco
Stauffer Chem. Co., 380 Madison Ave., N. Y.
Texas Sols. & Chems. Co., 8501 Market St., Houston
Tex-ite Prods. Corp., 859 E. 43 St., Brooklyn
Toledo Sols. & Chems. Co., 4501 South Ave., Toledo, O.
Treplow Chemical Co., 59 Camden St., Paterson, N. J.
Trio Chem. Wks., 341 Scholes St., Bklyn.
Ultra Chem. Wks., 2 Wood St., Paterson, N. J.
Uncle Sam Chem. Co., 573 W. 131st St., N. Y.
Western Sols. & Chems. Co., 6472 Solkiak Ave., Detroit
Wolverine Solvents & Chems. Co., 1500 Century Ave. SW, Grand Rapids
Wisconsin Sols. & Chems. Corp., 1719 S. 83rd St., Milwaukee
Witco Chem. Co., 122 E. 42nd St., N. Y.

CLEANING MACHINERY, BOTTLE (see Bottle Cleaning Equipment)

CLIPS (for collapsible Tubes) (see also Tubes, Collapsible)

Arthur Colton Co., 3426 E. Lafayette Ave., Detroit
Standard Spec. & Tube Co., New Brighton, Pa.

CLOSURE LINERS (see Cap Liners)

CLOSURES (see Caps)

COAL TAR DISINFECTANTS (see Disinfectants, Coal Tar)

COAL TAR RAW MATERIALS (Cresols, Creosote Oil, Cresylic Acid, etc.)

Allied Chem. Corp., Plastics Div., 40 Rector St., N. Y.
American-British Chem. Supplies, 180 Madison Ave., N. Y. 16
Baird & McGuire, Inc., Holbrook, Mass.
Concord Chem. Co., 250 S. 2nd St., Camden 1, N. J.
Inland Steel Co., 30 W. Monroe St., Chicago
Jones & Laughlin Steel Corp., 3 Gateway Center, Pittsburgh
Koppers Co., Pittsburgh 19
Monsanto Chemical Co., St. Louis
Penna. Industrial Chem. Corp., Clairton, Pa.
Reilly Tar & Chemical Co., Merchant Bank Bldg., Indianapolis
Robeco Chemicals, Inc., 25 E. 26th St., N. Y. 10
Tar Residuals, Inc., 420 Lexington Ave., N. Y. 17
U. S. Steel Corp., Pittsburgh, Pa.
James Varley & Sons, 1200 Switzer Ave., St. Louis

COCOA BUTTER

Biddle Sawyer Corp., 20 Vesey St., N. Y. 7
R. W. Greeff & Co., 10 Rockefeller Plaza, N. Y. 20
Orbis Products Corp., 601 W. 26th St., N. Y.
Robeco Chemicals, Inc., 23 E. 26th St., N. Y. 10
Woodward & Dickerson, Inc., Philadelphia 2

COCONUT OIL

Balfour, Guthrie & Co., 67 Wall St., N. Y.
Brazilian Industrial Oils, 82 Beaver St., N. Y.
Capital City Products Co., 525 W. 1st Ave., Columbus, O.
T. G. Cooper & Co., Cedar & Venango Sts., Phila. 34
E. F. Drew & Co., 15 E. 26 St., N. Y. 10
Geo. Degen & Co., 21 West St.,N.Y.
Eastern Industries, Inc., Ridgefield, N. J.
Foremost Food & Chem. Co., Oakland, Calif.
Hasselman, Seaman, de Ryss, Inc., 347 Madison Ave., N. Y. 17
Pacific Veg. Oil Corp., 1145 S. 10th St., Richmond, Calif.
J. H. Redding Co., 17 Battery Pl., N. Y.
Robeco Chemicals, Inc., 23 E. 26th St., N. Y. 10
Swift & Co., Hammond, Ind.
Jos. Turner & Co., Ridgefield, N. J.
Vegetable Oil Prods., 5568 E. 61st St., Los Angeles
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13
Woburn Chem. Corp., 1200 Harrison Ave., Kearny, N. J.

COCONUT OIL FATTY ACIDS

Acme-Hardesty Co., 60 W. 42nd St., N. Y. C.
Amato Agency, Inc., 11 Broadway, N. Y. 4
Archer-Daniels Midland Co., Minneapolis 2
Armour Industrial Chem. Co., 110 N. Wacker Dr., Chicago
Capital City Prods. Co., 525 W. 1st St., Columbus, O.
Concord Chemical Co., 205 S. 2nd St., Camden, N. J.
Darling & Co., 4201 S. Ashland Ave., Chicago 9
E. F. Drew & Co., 15 E. 26 St., N. Y. 10
Emery Industries, Carew Tower, Cincinnati 2
Foremost Food & Chem. Co., Oakland, Calif.
A. Gross & Co., 295 Madison Ave., N. Y. 17
Harchem Div., 25 Main St., Belleville 9, N. J.
M. Michel & Co., 90 Broad St., N. Y. 4
Onyx Oil & Chem. Co., Warren & Norris Sts., Jersey City, N. J.
Swift & Co., Hammond, Ind.
Joseph Turner & Co., Ridgefield, N. J.
Vegetable Oil Prods., 5568 E. 61st St., Los Angeles
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13
Wilson-Martin Division, Snyder & Swanson, Phila.
Woburn Chem. Co., 1200 Harrison Ave., Kearny, N. J.
G. S. Ziegler & Co., Great Neck, N. Y.

COCONUT OIL POWDERED SOAPS (see Soap, Powdered)

COCONUT OIL SHAMPOO BASE (see Shampoo Base)

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Adolph Gottscho, Inc., 6 Evans Terminal, Hillside, N. J.
Arthur Colton Co., 3431 E. Lafayette, Detroit
Bell-Mark Corp., 18 Ropes Pl., Newark, N. J.
Crompton & Knowles Packaging Corp., Berkshire St., Holyoke, Mass.
Griffin-Rutgers, Inc., 14 Harwood Ct., Scarsdale, N. Y.
Kiwi Coders Corp., 4027 N. Kedzie Ave., Chicago

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John R. Nalbach Eng. Co., 6139 W. Ogden Ave., Chicago
Weber Addressing Machine Co., Mt. Prospect, Ill.

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Chemicolloid Laboratories, 55 Herricks Rd., Garden City, N. Y.
J. H. Day Co., 4932 Beech St., Cincinnati
Filpaco Industries, 2464 S. Michigan Ave., Chicago
First Machy. Corp., 209 10 St., Brooklyn 15 (Used)
Gifford-Wood Co., 420 Lexington Ave., N. Y. C.
Laub Engineering Co., 244 N. San Marino Ave., San Gabriel, Cal. (Used)
Manton-Gaulin Mfg. Co., Everett, Mass.
G. Mazzoni, Busto Arsizio, Italy
Kinetic Dispersion Corp., Buffalo 16, N. Y.
Newman Tallow & Soap Mach. Co., 3601 S. Iron St., Chicago (Used)
Premier Mill Corp., 224 5th Ave., NYC 1
Franklin P. Miller & Son, 31 Meadow St., East Orange, N. J.
Skinner Engine Co., 337 W. 12 St., Erie, Pa.
Tri-Homo Corp., 90 Highland Ave., Salem, Mass.

COLORS, CERTIFIED

Allied Chem. Corp., National Aniline Div., 40 Rector St., N. Y.
American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
Ansbacher-Siegle Corp., Rosebank, Staten Island, N. Y.
Geigy Chemical Corp., Ardsley, N. Y.
H. Kohnstamm & Co., 161 6th Ave., New York
Leeben Color & Chem. Co., 103 Lafayette St., N. Y. 13
Pylam Prods., Co., 799 Greenwich St., N. Y. 14
Sterwin Chemicals, Inc., 1450 Broadway, N. Y. 18
Warner-Jenkinson Mfg. Co., 2526 Baldwin St., St. Louis

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Allied Chem. Corp., National Aniline Div., 40 Rector St., N. Y.
American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
Ansbacher-Siegle Corp., Rosebank, Staten Island, N. Y.
Ciba Co., Fair Lawn, N. J.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Dye Specialties, Inc., 26 Journal Sq., Jersey City 6, N. J.

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Leeben Color & Chem. Co., 103 Lafayette St., N. Y. 13
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Joseph H. Lowenstein & Sons, 420 Morgan Ave., Bklyn.
Patent Chemicals, Inc., 335 McLean Blvd., Paterson, N. J.
Pylam Prods. Co., 799 Greenwich St., N. Y. 14
Tamms Industries, Inc., 228 N. La Salle St., Chicago
Sandoz, Inc., 61 Van Dam St., N. Y.

COMPLEXING AGENTS

American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
Antara Chemicals, 435 Hudson St., N. Y. 14
Atlas Powder Co., Wilmington 99, Del.
Blockson Chemicals, Joliet, Ill.
Dawe's Laboratories, 4800 S. Richmond St., Chicago 32
Dow Chem. Co., Midland, Mich.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Emkay Chem. Co., 319 2nd St., Elizabeth, N. J.
Fiber Chem. Corp., Matawan, N. J.
Geigy Industrial Chems., Ardsley, N. Y.
Hampshire Chem. Corp., Nashua, N. H.
Mona Industries, Inc., 65 E. 23rd St., Paterson, N. J.
Monsanto Chemical Co., St. Louis, Mo.
Pfanstiehl Laboratories, 1219 Glen Rock Ave., Waukegan, Ill.
Chas. Pfizer & Co., 630 Flushing Ave., Bklyn.
Process Chems. Co., 8733 S. Dice Rd., Santa Fe Springs, Calif.
Refined Prods. Co., 624 Schuyler Ave., Lyndhurst, N. J.
Rumford Chem. Wks., 19 Newman Ave., Rumford, R. I.
Sole Chem. Corp., 7740 S. Chicago Ave., Chicago
Tanatex Chem. Corp., Belleville Turnpike, Kearny, N. J.
Victor Chemical Works, 155 N. Wacker Drive, Chicago

CONSULTANTS (Chemists, Engineers, Etc.)

Carl N. Anderson, 52 Vanderbilt Ave., N. Y. 17
Bio-Search Development Co., 2019 W. 71 Terrace, Kansas City, Mo.
Alvin J. Cox, 1118 Emerson St., Palo Alto, Calif.
A. Edison Badertscher, 1113 N. Rolling Rd., Baltimore, Md.
Evans Research & Development Corp., 250 E. 53 St., N. Y. 17
Hazleton Labs., Box 30, Falls Church, Va.
Hill Top Research Institute, Miamiville, O.
Hudson Laboratories, 117 W. 13th St., N. Y. 11
Industrial Biology Labs., Inc., Box 7346, Phila., Pa.
Industrial Bio-Test Labs., 1810 Frontage Rd., Northbrook, Ill.
Kroner Laboratories, Inc., P.O. Box 434, Great Neck, N. Y.
Leberco Labs., 123 Hawthorne St., Roselle Park, N. J.
Lawall & Harrison Res. Laboratories, 1921 Walnut St., Phila., Pa.
W. W. Lewers, 17 W. 60 St., N. Y. C.
Lodes Aerosol Consultants, Inc., 730 5th Ave., N. Y.
John J. Mahoney, 40 Park Pl., Newark, N. J.
J. W. McCutcheon, Inc., 236 Mt. Kemble Ave., Morristown, N. J.
Molnar Laboratories, 211 E. 19th St., N. Y.
Donald Price, 123 E. 92nd St., N. Y. 28
Reed Research Corp., Mill St., Huntington, Shelton, Conn.
Rosner-Hixon Laboratories, 7937 S. Chicago Ave., Chicago
Scientific Associates, 3755 Forest Park, St. Louis 8
Foster D. Snell, 29 W. 15th St., N. Y.
Stillwell & Gladding, 130 Cedar St., N. Y.
Testfabric, P. O. Box 567, Plainfield, N. J.
Wells Labs., 25 Lewis Ave., Jersey City, N. J.
Wisc. Alumni Research Foundation, Madison, Wisc.
Wurster & Sanger, 5201 S. Kenwood Ave., Chicago

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Celanese Plastics Co., 744 Broad St., Newark, N. J.
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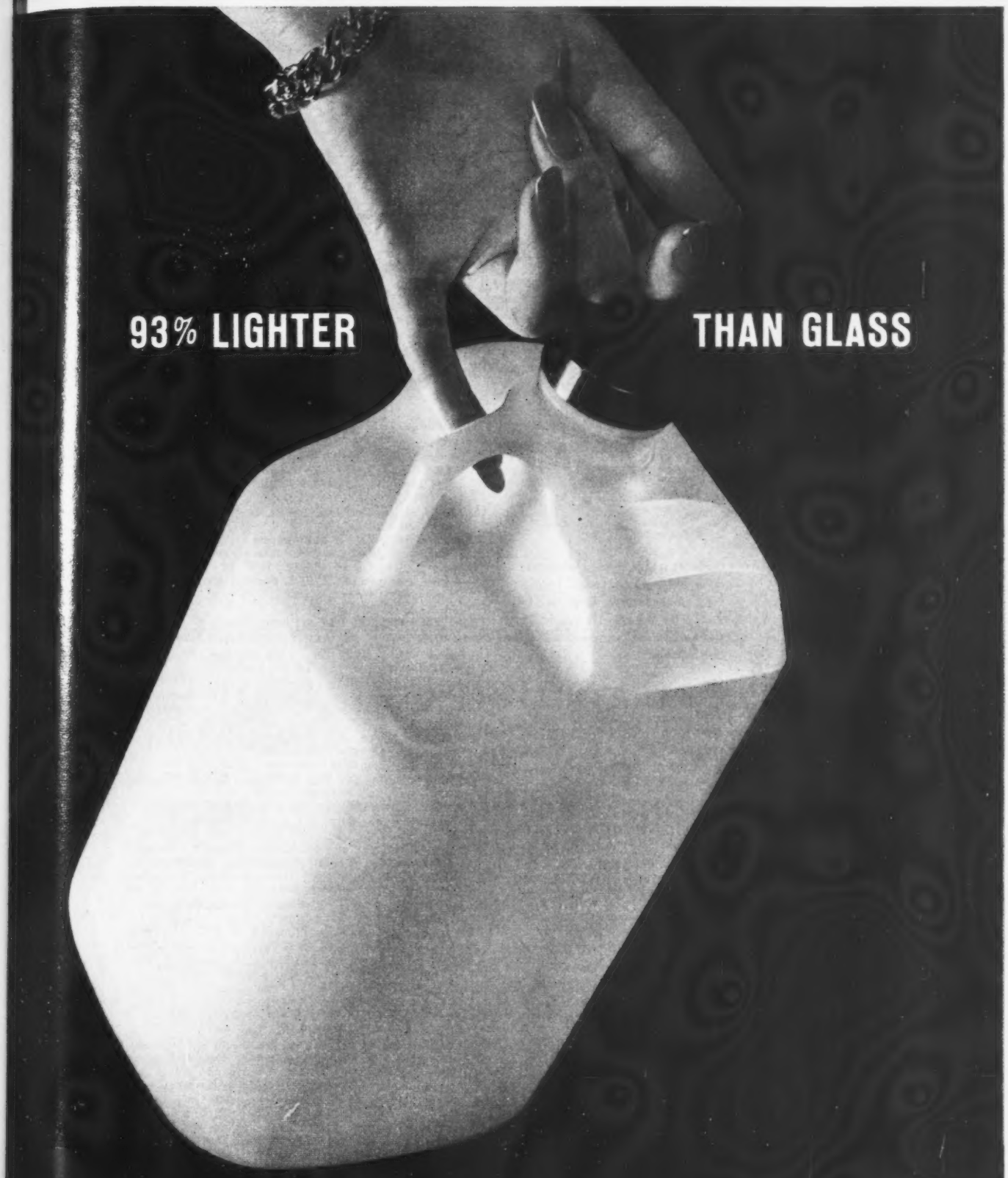

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Northwestern Bottle Co., 3144 N. Broadway, St. Louis
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Richford Corp., 3618 Oceanside Rd., Oceanside, N. Y.
Thatcher Glass Mfg. Co., 375 Park Ave., N. Y.
A. H. Wirz, Inc., 4th & Valer, Chester, Pa.
Wheaton Plastic-Cote Corp., Millville, N. J.

CONTAINERS (Specialty Metal)

Bridgeport Metal Goods Mfg. Co., Bridgeport 5, Conn.
Emson Research, Inc., Burr Ct., Bridgeport, Conn.
Metal Fabrications, Inc., 203 Cherry St., Waterbury, Conn.
Risdon Manufacturing Co., 400 Risdon St., Naugatuck, Conn.

CONTAINERS, STEEL SHIPPING (see Drums, Steel or Pails, Steel)

CONTINUOUS PROCESS SOAP AND DETERGENT PLANTS

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Emery Industries, Carew Tower, Cincinnati, O.
G. Mazzoni, Busto Arsizio, Italy
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Meccaniche Moderne, Coro Sempione 51, Busto Arsizio, Italy
Sharples Corp., 23rd & Westmoreland Sts., Phila. 40
A. Savy, Jeanjean & Cie, Ave. Dubonnet, Courbevoie, France
Foster D. Snell, 29 W. 15th St., N. Y. 11
Wurster & Sanger, Inc., 5201 S. Kenwood Ave., Chgo.

CONTRACT PACKAGING (see also Aerosol Filling for the Trade)

Acepak, Inc., 7230 S. Chicago Ave., Chicago 19
A-M-R Chem. Co., 985 E. 35th St., Brooklyn 10
Aero-Chem Fillers, Inc., 1981 State St., Ext., Bridgeport, Conn.
Aerosol Techniques, Inc., 1730 State St., Ext., Bridgeport, Conn.
Armstrong Laboratories, 421 LaGrange St., W. Roxbury, Mass.
G. Barr & Co., 3601 S. Racine Ave., Chicago
Bixon Chem. Corp., 1163 Southern Blvd., N. Y. 59
Britex Corp., 17 Lewis Wharf, Boston
Capitol Soap Corp., 310 Colfax Ave., Clifton, N. J.
Capitol Packaging Co., 1501 N. 31 Ave., Melrose Park, Ill.
Chase Prods. Co., Maywood, Ill.
Clarkson Laboratories 1470 Ferry St., Camden, N. J.
Continental Filling Corp., 123 N. Hazel, Danville, Ill.
Contract Packaging Corp., 320 Highland Ave., Passaic, N. J.
Federal Packaging Corp., 12160 South Peoria St., Chicago
Fluid Chem. Co., 878 Mt. Prospect Ave., Newark, N. J.
Frontier Chem. Prods., Inc., 119 E. Soper St., St. Louis
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Marcy Labs., 2161 N. Cal. Ave., Chicago, Ill.
National Research & Chem. Co., 12520 Cerise Ave., Hawthorne, Calif.
Old Empire Inc., Mt. Prospect & Verona Aves., Newark, N. J.
Pace, Inc., MacArthur Rd., Wilmington 99, Dela.
Packaging Corp., of America, 1372 S. Wilson St., Los Angeles
Paket, Inc., 9022 S. Baltimore St., Chicago
Peterson Filling & Packg. Co., Hegeler Lane, Danville, Ill.
Private Brands, Inc., 300 S. 3rd St., Kansas City 18, Mo.
Products Packaging, Inc., 6400 Herman Ave., Cleveland 2
Ralm Prods. Inc., 206 S. Larkin Ave., Joliet, Ill.
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Southern Chemical Prods. Co., 170 Poplar St., Macon, Ga.
Sun-Lac Inc., 195 Terminal Ave., Clark, N. J.
John C. Stalfort & Sons, 319 W. Pratt, Baltimore
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Tex-ite Prods. Corp., 859 E. 43 St., Brooklyn 10
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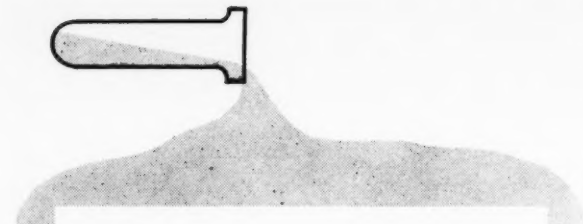

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Western Filling Corp., 6423 Bandini Blvd., Los Angeles 23
Wyatt Prods. Inc., 685 Metal Rd., N.E., Atlanta

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Alsop Engineering Corp., Milldale, Conn.
Chisholm-Ryder Co. of Pa., Hanover, Pa.
Clybourn Machine Corp., 6479 N. Avondale Ave., Chicago
Arthur Colton Co., 3431 E. Lafayette, Detroit
Economic Machy. Co., 60 Fremont St., Worcester, Mass.
Emhart Mfg. Co., Portland, Conn.
FMC Packaging Machy. Div., 4972 Summerdale Ave., Phila., Pa.
Filpaco Industries, 2464 S. Michigan Ave., Chicago
Gifford-Wood Co., 420 Lexington Ave., N. Y. 17
Horix Mfg. Co., 2609 Chartiers Ave., Pittsburgh
Houchin Div., 300 Straight St., Paterson, N. J.
Island Equip. Corp., 1090 E. 31st St., Hialeah, Fla.
Paul L. Karstrom Co., 1822 W. 74th St., Chicago 36
Karl Kiefer Machine Co., 919 Martin St., Cincinnati
Laub Engineering Co., 244 N. San Marino Ave., San Gabriel, Calif.
Link-Belt Co., 910 S. Michigan, Chicago
G. Mazzoni, Busto Arsizio, Italy
Meccaniche Moderne, Corso Sempione 51, Busto Arsizio, Italy
M. R. M. Co., 191 Berry St., Bklyn.
Newman Tallow & Soap Machy. Co., 3501 S. Iron St., Chicago (Used)
Pneumatic Scale Corp., Quincy 71, Mass.
Proctor & Schwartz, Inc., 7th St. and Tabor Rd., Phila. 20
Rapids Machinery Co., Marion, Iowa
Henry Simon Ltd., Cheadle Heath, Stockport, England
Sprout, Waldron & Co., Muncy, Pa.
Stephens-Adamson Mfg. Co., Aurora, Ill.
F. J. Stokes Machine Co., Tabor Rd., Phila., Pa.
Syntron Co., Homer City, Pa.
Tite-Cap Machine Co., 57 Rose St., N. Y. 7
Triangle Packaging Machy. Co., 6633 W. Diversey Blvd., Chicago
U. S. Bottlers Machy Co., 4019 N. Rockwell St., Chicago
Weigh Right Automatic Scale Co., Joliet, Ill.
Young Machy. Co., Muncy, Pa.

COPOLYMERS (see Polymer Emulsions and Solutions)

COPPER NAPHTHENATE

Carlisle Chem. Wks., Inc., Reading, O.
Cuprinol Div.,—Darworth, Inc., Simsbury, Conn.
Harshaw Chemical Co., 1945 E. 97th St., Cleveland
Koppers Co., Chamber of Commerce Bldg., Pittsburgh 19
Naftone, Inc., 515 Madison Ave., N. Y. 22
Oronite Div., Calif. Chem. Co., 200 Bush St., San Francisco
Robeco Chemicals, Inc., 25 E. 26th St., N. Y. 10
Socony Mobil Oil Co., 150 E. 42nd St., N. Y. 17
Witco Chem. Corp., 122 E. 42nd St., N. Y. 17

COPPER SULFATE (Blue Vitriol)

American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
W. R. E. Andrews Sales, Inc., 1505 Race St., Philadelphia 2, Pa.
J. T. Baker Chem. Co., Phillipsburg, N. J.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Harshaw Chemical Co., 1945 E. 97th St., Cleveland
Phelps Dodge Refining Corp., 40 Wall St., N. Y. 5
Robeco Chemicals, Inc., 25 E. 26th St., N. Y.
Tennessee Corp., Atlanta, Ga.
Jos. Turner & Co., Ridgefield, N. J.

CORKING MACHINERY

Horix Mfg. Co., 2609 Chartiers Ave., Pittsburgh
Karl Kiefer Machine Co., 919 Martin St., Cincinnati
Laub Engineering Co., 244 N. San Marino Ave., San Gabriel, Calif.
Newman Tallow & Soap Machy. Co., 3601 S. Iron St., Chicago (Used)
Pneumatic Scale Corp., Quincy 71, Mass.
Tite-Cap Machine Co., 59 Rose St., N. Y.
U. S. Bottlers Mchy. Co., 4019 N. Rockwell St., Chicago

CORKS

Armstrong Cork Co., Lancaster, Pa.
Continental Can Co., 100 E. 42nd St., N. Y. 17
Dodge Cork Co., Lancaster, Pa.

CORN COBS, Ground

Archer-Daniels-Midland Co., Minneapolis
Corn Products Sales Co., 17 Battery Pl., N. Y.
Spencer Kellogg & Sons, Buffalo, N. Y.

CORN MEAL

American Maize Prods. Co., 250 Park Ave., N. Y.
Corn Products Sales Co., 17 Battery Pl., N. Y.
Spencer Kellogg & Sons, Buffalo, N. Y.

CORN OIL

American Maize Prods. Co., 250 Park Ave., N. Y.
Balfour, Guthrie & Co., Ltd., 67 Wall St., N. Y.
Commercial Solvents Corp., 260 Madison Ave., N. Y.
T. G. Cooper & Co., Cedar & Venango Sts., Phila.
Corn Products Sales Co., 17 Battery Pl., N. Y.
E. F. Drew & Co., 15 E. 26 St., N. Y. 10
Otto A. C. Hagen Corp., 929 Public Ledger Bldg., Phila.
Spencer Kellogg & Sons, 98 Delaware Ave., Buffalo, N. Y.
National Starch & Chem. Corp., 750 3rd Ave., N. Y. 17
Pacific Vegetable Oil Corp., 1145 S. 10 St., Richmond, Calif.
Swift & Co., Hammond, Ind.
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13

CORN OIL FATTY ACIDS

Archer-Daniels-Midland Co., Minneapolis 2, Minn.
Armour Industrial Chem. Co., 110 N. Wacker Dr., Chicago
Capital City Prods. Co., 525 W. 1st St., Columbus, O.
Corn Prods. Sales Corp., 17 Battery Pl., N. Y. 4
Emery Industries, Carew Tower, Cincinnati
E. F. Drew & Co., 15 E. 26 St., N. Y. 10
A. Gross & Co., 295 Madison Ave., N. Y. 17
Harchem Div., 25 Main St., Belleville 9, N. J.
Kamen Soap Prods. Co., 5-22 50 Ave., L. I. C. 1, N. Y.
A. E. Staley Mfg. Co., Decatur, Ill.
Swift & Co., Hammond, Ind.
Joseph Turner & Co., Ridgefield, N. J.
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13
Wilson-Martin Div., Snyder Ave., & Swanson St., Phila.
Woburn Chemical Corp., 1200 Harrison Ave., Kearny, N. J.
G. S. Ziegler & Co., Box 348, Great Neck, N. Y.

CORN STARCH (see Starch)

COSMETICS (Private Brand Compacts, Lipsticks, Etc.)

Averil, Inc., 6780 NW 37 Ct., Miami, Fla.
G. Barr & Co., 3601 S. Racine Ave., Chicago
Dominion Products, Inc., 10-40 44 Dr., L. I. C., N. Y.
Flam-Haft Laboratories, 8 E. 12th St., N. Y. 3
Fluid Chem. Co., 878 Mt. Prospect Ave., Newark, N. J.
Frontier Chem. Prods., 119 E. Soper St., St. Louis 11
R. Gesell, Inc., 200 W. Houston St., N. Y.
Old Empire, Inc., Mt. Prospect & Verona Ave., Newark, N. J.
Peterson Filling & Packaging Co., Danville, Ill.

COTTONSEED FATTY ACIDS (and Soapstock)

Archer-Daniels-Midland Co., Minneapolis 2
Armour Industrial Chem. Co., 110 N. Wacker Dr., Chicago
Capital City Prods. Co., 525 W. 1st Ave., Columbus 16, O.
Concord Chemical Co., 205 S. 2nd St., Camden 1, N. J.
T. G. Cooper & Co., Cedar & Venango Sts., Phila.
E. F. Drew & Co., 15 E. 26th St., N. Y. 10
Eastern Industries, Inc., Ridgefield, N. J.
Emery Industries, Inc., 4300 Carew Tower, Cincinnati
A. Gross & Co., 295 Madison Ave., N. Y.
Harchem Div., 25 Main St., Belleville 9, N. J.
Humko Chem. Dept., 501 Allwood Ave., Clifton, N. J.
Kamen Soap Prods. Co., 5-22 50 Ave., L. I. C. 1, N. Y.
Swift & Co., Hammond, Ind.
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13
Wilson-Martin Div., Snyder & Swanson, Phila.
Woburn Chemical Corp., 1200 Harrison Ave., Kearny, N. J.
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Pacific Vegetable Oil Corp., 1145 S. 10 St., Richmond, Calif.
J. H. Redding Co., 17 Battery Pl., N. Y.
Robeco Chemicals, Inc., 23 E. 26th St., N. Y.
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13

COUMARIN (see also Aromatic Chemicals)

Aromatic Products, Inc., 235 4th Ave., N. Y. 3
Dodge & Olcott, Inc., 75 9th Ave., N. Y.
Dow Chemical Co., Midland, Mich.
Felton Chemical Co., 603 Johnson Ave., Brooklyn
Florasynth Laboratories, 900 Van Nest Ave., N. Y.
Fritzsche Bros., 76 Ninth Ave., N. Y. 11
Givaudan-Delawanna, 321 W. 44th St., N. Y.
International Flavors & Fragrances, Inc., 521 W. 57 St., N. Y. C.
Geo. Lueders & Co., 427 Washington St., N. Y. 13
Lautier Fils, 321 5th Ave., N. Y. 16
Magnus, Mabee & Reynard, 16 Debrosses Street, N. Y.
Maywood Chemical Works, Maywood, N. J.
Monsanto Chemical Co., St. Louis, Mo.
Neumann-Buslee & Wolfe, 5800 Northwest Highway, Chicago
Norda Essential Oil & Chem. Co., 601 W. 26th St., N. Y.
Orbis Prods. Corp., 601 W. 26th St., N. Y. 1
S. B Penick & Co., 100 Church St., N. Y. 8
Perry Bros., 61-12 32 Ave., Woodside, N. Y.
Roubechez, Inc., 39 Roselle St., Mineola, N. Y.
Rhodia, Inc., 60 E. 56th St., N. Y.
Schimmel & Co., Newburgh, N. Y.
Sterwin Chemicals, Inc., 1450 Broadway, N. Y.
Ungerer & Co., 161 Ave. of Americas, N. Y. 13
Verona Aromatics, 26 Verona Ave., Newark, N. J.

CREOSOTE (see Coal Tar Raw Materials)

CRESOL COMPOUND, U.S.P. and Technical (see Disinfectants, Coal Tar)

CRESOLS

Allied Chem. Corp., Plastics Div., 40 Rector St., N. Y.
American-British Chem. Supplies, 180 Madison Ave., N. Y. 16
American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
Baird & McGuire, Inc., Holbrook, Mass.
Coal Tar Chemicals Corp., 420 Lexington Ave., N. Y.
Concord Chem. Co., 205 S. 2nd St., Camden 1, N. J.
Koppers Co., Pittsburgh 19
Monsanto Chemical Co., St. Louis
Neville Chemical Co., Pittsburgh 25
Penna. Industrial Chem. Corp., Clairton, Pa.
Pitt-Consol Chem. Co., 191 Doremus Ave., Newark, N. J.
Reilly Tar & Chemical Co., Merchants Bank Bldg., Indianapolis
Robeco Chemicals, Inc., 25 E. 26th St., N. Y.
Tar Residuals, Inc., 420 Lexington Ave., N. Y.
U. S. Steel Corp., Pittsburgh 30

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Allied Chem. Corp., Plastics Div., 40 Rector St., N. Y.
American-British Chem. Supplies, 180 Madison Ave., N. Y 16
American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
Atlantic Refining Co., 260 S. Broad St., Phila. 1
Baird & McGuire, Inc., Holbrook, Mass.
Concord Chemical Co., 205 S. 2nd St., Camden 1, N. J.
Koppers Co., Pittsburgh 19
Monsanto Chemical Co., St. Louis
Pitt-Consol Chem. Co., 191 Doremus Ave., Newark, N. J.
Reilly Tar & Chem. Corp., Merchants Bank Bldg., Indianapolis
Robeco Chemicals, Inc., 23 E. 26 St., N. Y.
Shell Oil Co., 50 W. 50th St., N. Y. 20
Socony Mobil Oil Co., 150 E. 42nd St., N. Y. 17
Standard Oil Co., of Calif., San Francisco
United States Steel Co., Pittsburgh 30
James Varley & Sons, 1200 Switzer Ave., St. Louis 15

CRUTCHERS

Edge Moor Iron Wks., Edge Moor, Del.
Houchin Div., 300 Straight St., Paterson, N. J.
G. Mazzoni, Busto Arsizio, Italy
Mecchaniche Moderne, Corso Sempione 51, Busto Arsizio, Italy
Newman Tallow & Soap Machy. Co., 3601 S. Iron St., Chicago
H. K. Porter Co., Oliver Bldg., Pittsburgh
Struthers-Wells Co., Warren, Pa.

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Camilli, Albert & Laloue, 15 E. 48th St., N. Y. 17
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Food Machy. & Chem. Corp., 441 Lexington Ave., N. Y.
McLaughlin, Gormley, King Co., 1715 5th St., SE, Minneapolis
S. B. Penick & Co., 100 Church St., N. Y. 7
Prentiss Drug & Chem. Co., 101 W. 31st St., N. Y.

CUTTING TABLES (see Soap Machinery)

CYANIDES (see Fumigants) (see Sodium Cyanide)

CYCLOHEXANE

Continental Oil Co., 1270 Ave. of Americas, N. Y.
Philips Petroleum Co., Bartlesville, Okla.
Signal Oil & Gas Co., Houston, Tex.

CYCLOHEXANOL

Allied Chem. Corp., National Aniline Div., 40 Rector St., N. Y.
Allied Chem. Corp., Plastics Div., 40 Rector St., N. Y.
E. I. du Pont de Nemours & Co., Wilmington
Monsanto Chemical Co., St. Louis, Mo.

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Allied Chem. Corp., National Aniline Div., 40 Rector St., N. Y.
E. I. du Pont de Nemours & Co., Wilmington
Monsanto Chem. Co., St. Louis, Mo.

2, 4 D (see also Weed Killers)

Allied Chem. Corp., General Chem. Div., 40 Rector St., N. Y.
Diamond Alkali Co., Union Commerce Bldg., Cleveland
Dow Chem. Co., Midland, Mich.
Monsanto Chem. Co., St. Louis
Stauffer Chem. Co., 380 Madison Ave., N. Y.

DAUBERS (see Shoe Polish Daubers)

DAIRY SPRAYS (see Cattle Dips and Sprays)

DDT (Dichloro-diphenyl-trichloroethane) (Technical)

Allied Chem. Corp., General Chem. Div., 40 Rector St., N. Y.
Diamond Alkali Co., Union Commerce Bldg., Cleveland
Geigy Agricultural Chemicals, Ardsley, N. Y.
R. W. Greeff & Co., 10 Rockefeller Plaza, N. Y.
Olin Mathieson Chem. Corp., Ind. Chems., Baltimore 3
Monsanto Chem. Co., St. Louis, Mo.
Montrose Chem. Co., 120 Lister Ave., Newark, N. J.
Pennsalt Chems. Corp., 3 Penn Center, Phila.
Prentiss Drug & Chem. Co., 101 W. 31 St., N. Y. 1
Stauffer Chemical Co., 380 Madison Ave., N. Y.

DDT FORMULATIONS (Liquids and Powders)

ABC Compounding Co., Oakcliff & Harwell Rds., SW, Atlanta, Ga.
Allied Chem. Corp., General Chem. Div., 40 Rector St., N. Y.
American Potash & Chem. Corp., 3030 W. 6th St., Los Angeles
A-M-R Chemical Co., 985 E. 35th St., Bklyn. 10
Baird & McGuire, Inc., Holbrook, Mass.
Barnett Chemical Products Co., 326 Lafayette Bldg., Phila. 6
California Spray-Chemical Corp., Richmond, Calif.
Chem. Compounding Corp., 262 Huron St., Bklyn.
Chem. Insecticide Corp., 30 Whiteman Ave., Metuchen, N. J.
Detteibach Chem. Corp., 4111 Peachtree Rd., Atlanta 19
Diamond Alkali Co., Union Commerce Bldg., Cleveland
Dow Chemical Co., Midland, Mich.
E. I. du Pont de Nemours & Co., Wilmington
Fine Organics, Inc., 205 Main St., Lodi, N. J.
Food Machy. & Chem. Corp., 441 Lexington Ave., N. Y. 17
Freesmeier Laboratories, 3661 Windsor Pl., St. Louis 13
Frontier Chem. Prods., Inc., 119 E. Soper St., St. Louis
Fuld Bros., 702 S. Wolfe St., Baltimore
Geigy Agric. Chem., Ardsley, N. Y.
Hub States Chems. & Equipment, 1255 N. Windsor St., Indianapolis
Hysan Products Co., 930 W. 38th Pl., Chicago
Kamen Soap Prods. Co., 5-22 50 Ave., L. I. C., N. Y.
Klix Chem. Co., 551 Railroad Ave., S. San Francisco
McLaughlin, Gormley, King Co., 1715 5th St., Minneapolis
Midland Laboratories, Dubuque, Iowa
Miller Products Co., 1932 S. W. Water Ave., Portland, Ore.
Olin Mathieson Chem. Corp., Ind. Chems., Baltimore
S. B. Penick & Co., 100 Church St., N. Y.
Pennsalt Chems. Corp., 3 Penn Center Plaza, Phila.
Prentiss Drug & Chem. Co., 101 W. 31st St., N. Y. 1
Private Brands, Inc., 300 S. 3 St., Kansas City, Kan.
Puro Co., 2801 Locust St., St. Louis 3
Residex Corp., Clark, N. J.
Shell Chem. Corp., 50 W. 50th St., N. Y. 20
Stauffer Chem. Co., 380 Madison Ave., N. Y.
Swift & Co., Chicago 9
Tex-ite Prods. Corp., 859 E. 43 St., Brooklyn
Thompson-Hayward Chem. Co., 2915 SW Blvd., Kansas City 8
Uncle Sam Chemical Co., 575 W. 131 St., N. Y. 27
United-Heckathorn, 600 S. 4 St., Richmond, Calif.
U. S. Sanitary Specialties Corp., 1001 S. California Ave., Chicago
James Varley & Sons, 1200 Switzer Ave., St. Louis 15

DDVP FORMULATIONS

Agricultural Specialties, 12200 Denton Dr., Dallas, Tex.
Prentiss Drug & Chem. Co., 101 W. 31 St., N. Y.
Stecker Chems., Inc., 45 N. Broad St., Ridgewood, N. J.
Tex-ite Prods. Corp., 859 E. 43 St., Bklyn.
United-Heckathorn, 600 S. 4 St., Richmond, Calif.

DEALERS (Chemicals)

Akron Chem. Co., 1025 Sweitzer Ave., Akron, Ohio
American-British Chem. Supplies, 180 Madison Ave., N. Y.
Amsco Solvents & Chemicals Co., 4619 Reading Road, Cincinnati 29
Axton-Cross Co., Shelton, Conn.
Baker & Gaffney, Drexel Bldg., Philadelphia
H. J. Baker & Bro., 600 5th Ave., N. Y.
H. J. Baker & Bro., 271 Madison Ave., N. Y.
Barada & Page, Kansas City, Mo.
S. H. Bell Co., 1407 Gulf Bldg., Pittsburgh
Banner Chemical Co., 20 N. Wacker St., Chicago
Berkshire Chemicals, Inc., 420 Lexington Ave., N. Y. 17
Buffalo Solvents & Chemicals Corp., Box 73 Station B, Buffalo 7, N. Y.
John H. Calo Co., 19 Rector St., N. Y. 6
Central Solvents & Chemical Co., 2540 W. Flournoy St., Chicago 12
John A. Chew, Inc., 60 E. 42nd St., N. Y.
Consumers Chemical Co., Drexel Bldg., Philadelphia
T. G. Cooper & Co., Cedar & Venango Sts., Phila. 34
Dickerson Co., Drexel Bldg., Phila.
Dixie Sols. & Chems. Co., Dixie Highway, Louisville, Ky.
Doe & Ingalls, 56 Garden St., Boston
A. C. Drury & Co., 219 E. North Water St., Chicago
Eastern Industries, Ridgefield, N. J.
Eaton Clark Co., 1490 Franklin St., Detroit
Faesy & Besthoff, 25 E. 26th St., N. Y.
Alex C. Fergusson Co., Drexel Bldg., Phila.
Fisher Chem. Co., 355 Lexington Ave., N. Y. C.
Fort Pitt Chemical Co., 3134 Penn Ave., Pittsburgh
Gaylord Chem. Co., 701 Woodsweather Rd., Kansas City
Griffin Chem. Co., 1000 16th St., San Francisco
Otto A. C. Hagen Corp., 929 Public Ledger Bldg., Phila.
C. P. Hall Co., Akron, Ohio
Hoosier Solvents & Chemicals Corp., 1650 Luett Ave., Indianapolis
Hub States Chems. & Equipment ,1255 N. Windsor St., Indianapolis
Hummel Chemical Co., 90 West St., N. Y.
Innis Speiden & Co., 420 Lexington Ave., N. Y.
P. J. Lo Bue Co., 277 Park Ave., N. Y.
Los Angeles Chem. Co., 2200 Santa Fe Ave., Los Angeles
Joseph H. Lowenstein & Sons, 420 Morgan Ave., Bklyn.
John F. Maher & Co., 1600 Henderson St., Houston, Tex.
McKesson & Robbins Inc., 155 E. 44 St., N. Y. C.
Millmaster Chem. Corp., 99 Park Ave., N. Y.
Newman Tallow & Soap Machinery Co., 3601 S. Iron St., Chicago
Missouri Solvents & Chemicals Co., 419 De Soto Ave., St. Louis 7, Mo.
Clarence Morgan & Co., 919 N. Michigan Ave., Chicago
Wm. D. Neuberg Co., 420 Lexington Ave., N. Y.
Neumann-Buslee & Wolfe, 5800 Northwest Highway, Indianapolis
Newman Tallow & Soap Machinery Co., 1051 W. 35th St., Chicago
Ohio Solvents & Chemicals Co., 3470 W. 140th St., Cleveland 11, Ohio
Prior Chem. Corp., 420 Lexington Ave., N. Y. 17
G. S. Robins & Co., 126 Chouteau Ave., St. Louis
Robeco Chemicals, Inc., 25 E. 26th St., N. Y.
Southern Solv. & Chem. Corp., Jefferson Highway, New Orleans
K. A. Steel Chems. Inc., 7450 Stony Island Ave., Chicago
Tar Residuals, Inc., 420 Lexington Ave., N. Y.
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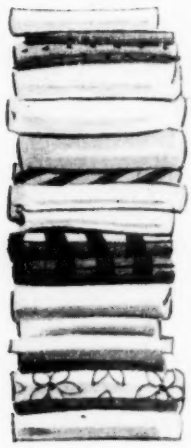

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CALIFORNIA CHEMICAL COMPANY
ORONITE DIVISION

EXECUTIVE OFFICES • 200 Bush Street, San Francisco 20, California
SALES OFFICES • New York, Boston, Wilmington, Chicago, Cincinnati, Cleveland, Houston, Tulsa, Los Angeles, San Francisco, Seattle
FOREIGN AFFILIATE • California Chemical International, Inc., San Francisco, Geneva, Panama, Sao Paulo

* California Chemical Company's trademark for its detergent intermediate.

DEALERS (Chemicals) (Cont'd.)

Toledo Sols. & Chems. Co., 4051 South Ave., Toledo, O.
Arthur C. Trask Co., 4103 S. La Salle St., Chicago
Jos. Turner & Co., Ridgefield, N. J.
Chas. A. Wagner Co., 4455 N. 6th St., Phila.
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13
Western Solvents & Chemicals Co., 6472 Selkirk Ave., Detroit 11
Wisconsin Solvents & Chemicals Corp., 1719 S. 83rd St., Milwaukee
Wolverine Solv. & Chem. Co., 2940 Stafford Ave., SW, Grand Rapids

DEALERS (Oil and Fats)

Balfour, Guthrie & Co., 67 Wall St., N. Y.
John H. Calo Co., 19 Rector St., N. Y. 6
T. G. Cooper & Co., Cedar & Venango Sts., Phila.
Geo. Degen & Co., 21 West St., N. Y.
Otto A. C. Hagen Corp., 929 Public Ledger Bldg., Phila.
Hasselman, Seaman, de Ryss, Inc., 347 Madison Ave., N. Y.
Leghorn Trading Co., 141 E. 44th St., N. Y. C.
Joseph H. Lowenstein & Sons, 420 Morgan Ave., Bklyn.
Miller & Co., 2401 Chestnut St., Philadelphia
Murray Oil Products Co., 21 West St., N. Y.
Neatsfoot Oil Refineries Corp., E. Ontario & Bath Sts., Phila.
Newman Tallow & Soap Machinery Co., 3601 S. Iron St., Chicago
Robeco Chemicals, Inc., 25 E. 26th St., N. Y. 10
Willibald Schaefer Co., Foot of Boemen Ave., St. Louis
Smith-Weihman Co., 15 Moore St., N. Y.
Arthur C. Trask Co., 4103 S. La Salle St., Chicago
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13

DECOLORIZING CARBONS

Atlas Powder Co., Wilmington, Del.
Cliffs-Dow Chem. Co., Marquette, Mich.
R. W. Greeff Co., 10 Rockefeller Plaza, N. Y.
Industrial Chem. Sales Div., 230 Park Ave., N. Y.
Pennsalt Chems. Corp., 3 Penn Center, Phila.

DEFOAMERS

Air Reduction Chem. & Carbide Co., 150 E. 42nd St., N. Y. C.
Antara Chemicals, 435 Hudson St., N. Y.
American Alcolac Corp., 3440 Fairfield Rd., Baltimore
Armour Ind. Chem. Co., 110 N. Wacker Dr., Chicago 6
Atlas Powder Co., Wilmington 99, Del.
Continental Chem. Co., 195 21 Ave., Paterson, N. J.
Dow Corning Corp., Midland, Mich.
E. F. Drew & Co., 15 E. 26 St., N. Y. 10
Emkay Chem. Co., Elizabeth 1, N. J.
Fine Organics, Inc., 205 Main St., Lodi, N. J.
Finetex, Inc., 418 Falmouth Ave., E. Paterson, N. J.
General Electric Co., Waterford, N. Y.
Glyco Chemicals Div., 417 5 Ave., N. Y.
Hercules Powder Co., Wilmington
Hodag Chem. Corp., 7247 N. Central Park, Chicago 45
Jefferson Chem. Co., 1121 Walker Ave., Houston, Tex.
Kessler Chem. Co., State Rd., Phila. 35
M. Michel & Co., 90 Broad St., N. Y. 4
Monsanto Chem. Co., St. Louis, Mo.
Nalco Chem. Co., 6215 W. 66 Pl., Chicago
Nopco Chem. Co., 60 Park Pl., Newark 1, N. J.
Onyx Chemical Corp., Warren & Morris Sts., Jersey City, N. J.
Rozilda Laboratories, 44-18 Purvis St., L. I. C., N. Y.
Silicones Div., Union Carbide Corp., 270 Park Ave., N. Y.
Sole Chem. Corp., 7740 S. Chicago Ave., Chicago 19
Swift & Co., Hammond, Ind.
Tanatex Chem. Corp., Belleville Turnpike, Belleville, N. J.
Witco Chem. Co., 122 E. 42 St., N. Y. 17
Wyandotte Chemicals Corp., Mich. Alkali Div., Wyandotte, Mich.

DEGREASING COMPOUNDS (see Cleaners)

DEODORANT SOAP (see Soaps, Antiseptic)

DEODORANTS (Basic chemicals for deodorant toilet soaps, lotions, etc.)

Barlow Chem. Corp., Ossining, N. Y.
Catalin Corp. of Am., 1 Park Ave., N. Y.
Dow Chem. Co., Midland, Mich.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Fine Organics, Inc., 205 Main St., Lodi, N. J.
Fleetwood Prods. Co., 509 5th Ave., N. Y. 17
Heyden Div., Heyden Newport Chem. Co., 342 Madison Ave., N. Y. 17
Hilton-Davis Chemical Co., 2235 Langdon Farm Rd., Cincinnati
Monsanto Chemical Co., St. Louis, Mo.
Olin Mathieson Chem. Corp., Ind. Chems., Baltimore 3
Onyx Chemical Corp., Warren & Morris Sts., Jersey City, N. J.
Ottawa Chem. Co., 819 Hamilton, Toledo, O.
Rohm & Haas Co., 222 W. Washington Square, Phila. 5
Sindar Corp., 321 W. 44th St., N. Y.
Sole Chem. Corp., 7740 S. Chicago Ave., Chicago
Stecker Chemicals, Inc., 45 N. Broad St., Ridgewood, N. J.
Sterwin Chemicals, Inc., 1450 Broadway, N. Y. 18
Union Carbide Chems. Co., 270 Park Ave., N. Y.
R. T. Vanderbilt Co., 230 Park Ave., N. Y.

DEODORANTS, Room Deodorants, Air Conditioning, etc., (see listings Aerosol Deodorants; Disinfectants; Glycol Sprays)

DEODORIZED BASE OILS (see Insecticide Oils)

DEODORIZING BLOCK HOLDERS

Chem. Service of Baltimore, Howard & West Sts., Baltimore
Chicago Sanitary Prods. Co., 3100 S. Throop St., Chicago
Cin-Made Corp., 800 E. Ross Ave., Cincinnati 1
Franklin Metal Prods. Co., 16 W. Kinzie St., Chicago
Fuld Bros., 702 S. Wolfe St., Baltimore
Hysan Prods. Co., 930 W. 38th Place, Chicago
Kleenaire Kemikils, 2227 24th St., Detroit
Puro Co., 2801 Locust St., St. Louis
Shore Calnevar, Inc., 2881 E. Pico Blvd., Los Angeles
Uncle Sam Chem. Co., 573 W. 131st St., N. Y. 27
U. S. Sanitary Specialties Corp., 1001 S. Calif., Chicago 12

DEODORIZING BLOCKS AND CRYSTALS

ABC Compounding Co., Oakcliff & Harwell Rds., SW, Atlanta, Ga.
Airkem, Inc., 241 E. 44th St., N. Y.
Allied Chem. Corp., Solvay Process Div., 61 Broadway, N. Y.
A-M-R Chemical Co., 985 E. 35th St., Brooklyn 18
B & W Chemical Co., 25920 Belle Porte, Harbor City, Calif.
Barnett Chemical Products Co., 326 Lafayette Bldg., Phila. 6
Chem. Service of Balto., Howard & West Sts., Balto.
Click Chemical Co., Columbus & Carleton Ave., Mt. Vernon, N. Y.
Clifton Chemical Co., 150 Nassau St., N. Y. C.
Chicago Sanitary Prods. Co., 3100 S. Throop St., Chicago
Davies-Young Soap Co., Dayton, O.
Fuld Bros., 702 S. Wolfe St., Baltimore
James Good, Inc., 2107 Susquehanna Ave., Phila.
Hysan Prods. Co., 930 W. 38th Place, Chicago
Kleenaire Kemikils, Inc., 2227 24th St., Detroit
Klix Chem. Co., 551 Railroad Ave., S. San Francisco
Peck's Prods. Co., 610 E. Clarence Ave., St. Louis
Puro Co., 2801 Locust St., St. Louis
Trio Chem. Wks., 341 Scholes St., Bklyn.
Uncle Sam Chem. Co., 573 W. 131st St., N. Y.
James Varley & Sons, 1200 Switzer Ave., St. Louis 15

DEODORIZING BLOCK PERFUMES (see Perfuming Compounds)

DEODORIZING BLOCK PRESSES (see Presses)

DEODORIZING AND BLEACHING EQUIPMENT (For Oils)

Blaw-Knox Corp., Chicago
Foster-Wheeler Corp., 165 Broadway, N. Y.
William Garrigue & Co., 9 S. Clinton St., Chicago
Girdler Process Equipment Div., Louisville, Ky.
Houchin Division, 300 Straight St., Paterson, N. J.
G. Mazzoni, Busto Arsizio, Italy
Newman Tallow & Soap Machinery Co., 3601 S. Iron St., Chicago
F. J. Stokes Machine Co., 5918 Tabor Rd., Phila.
Wurster & Sanger, Inc., 5201 S. Kenwood Ave., Chicago

DERRIS

Chemical Insecticide Corp., 30 Whitman Ave., Metuchen, N. J.
Food Machy. & Chem. Corp., 441 Lexington Ave., N. Y.
McLaughlin, Gormley, King Co., 1715 5th St., SE, Minneapolis
S. B. Penick & Co., 100 Church St., N. Y. 7
Prentiss Drug & Chem. Co., 101 W. 31st St., N. Y.

DETERGENT FEEDERS (see Soap Dispensers, Dishwashing Compound)

DETERGENT INTERMEDIATES

Allied Chem. Corp., National Aniline Div., 40 Rector St., N. Y.
American Alcolac Corp., 3440 Fairfield Rd., Baltimore
Amer. Potash & Chem. Corp., 3030 W. 6th St., Los Angeles

SURFACTANTS

YOU CAN SAVE WITH ONE
AMERICA'S MOST COMPLETE LINE OF NT

THE PRODUCTS

LAURYL SULFATES

STEPANOL WA	Sodium Lauryl Sulfate
STEPANOL WAT	Triethanolamine Lauryl Sulfate
STEPANOL DEA	Diethanolamine Lauryl Sulfate
STEPANOL MG	Magnesium Lauryl Sulfate
STEPANOL AM	Ammonium Lauryl Sulfate
STEPANOL T-28	Foam stabilized blend
STEPANOL ME DRY	Powdered Sodium Lauryl Sulfate
STEPANOL ME DRY AW	Powdered—dentifrice grade

NONIONICS

MAKON 4, 6, 10, 14, 30	Nonyl Phenol Ethylene Oxide condensates
STEPANOL TBK	Alkoxy Poly-oxyethylene Eth
AMIDOX L SERIES	Ethoxylated ami
AMIDOX C SERIES	Ethoxylated ami
MAKON B SERIES	Mixed Alkyl Phe Ethoxylates

SULFONATES

STEPAN DS-60	Desalted Sodium Alkyl Aryl Sulfon

LABORATORY ASSISTANC

The Stepan Chemical Company has complete laboratory facilities to assist you every way possible toward developing the product most suited to your needs. Our technical staff will be pleased to cons with you on new products as well as new applications of our presen products.

STEPA
CHEMICAL COMP

SUPERMARKET

IT ONE-STOP" BUYING FROM SYNTHETIC DETERGENT RAW MATERIALS

NEX 300 . . . . . Triethanolamine Alkyl Aryl Sulfonate
EPAN A AS . . . . . Ammonium Alkyl Aryl Sulfonate
NEX 303 . . . . . Sodium Xylene Sulfonate
EPANAT T . . . . . Sodium Toluene Sulfonate
EPANAT K . . . . . Potassium Toluene Sulfonate
NATE 41 . . . . . Oil Soluble Amine Alkyl Aryl Sulfonate
NATE 4(. . . . . Oil Soluble Calcium Alkyl Aryl Sulfonate
EPAN D -20 . . . . . Potassium Alkyl Aryl Sulfonate with coupler
LFONIC 90 . . . . . Dodecylbenzene Sulfonic Acid
LFONIC 100 . . . . . Dodecylbenzene Sulfonic Acid

ROTEIN CONDENSATES

AYPON 4C, 4CT . . . . . Mild, non-irritating protein condensates
AYPON POLYPEPTIDE 37 Sodium salt of polypeptide
AYPON SK . . . . . Sodium salt of protein condensate . . . Soluble in high alkaline concentrates

KYLOLAMIDES

NOL 1281 . . . . . Coconut Diethanolamide

NINOL 1301 . . . . . New type, quaternary compatible amide
NINOL AA-62 . . . . . Lauric Alkylolamide
NINOL AA-62 EXTRA . . . High Active Lauric Alkylolamide
STEPAN LIPA . . . . . Lauric Monoisopropanolamide
NINOL 201 . . . . . | Oil Soluble
NINOL HA-10 . . . . . | Alkylolamides
STEPAN HDA-7 . . . . . Alkali soluble Alkylolamide
STEPAN T-6-B . . . . . Cosmetic grade Alkylolamide

BLENDED EMULSIFIERS

TOXIMUL R & S . . . . . All-purpose pair for all pesticides
TOXIMUL LF . . . . . Universal emulsifier for pesticides in liquid fertilizers
EMULSIFIER WHC . . . . Single emulsifier for Waterless Hand Cleaners

BLENDED DETERGENTS

STEPAN LD-55A . . . . . Liquid Dishwash, ready to package
NINEX 26 . . . . . Highly concentrated liquid detergent for further dilution

ALSO

NONYL PHENOL
PARA-TERTIARY BUTYLPHENOL
METHYL ESTERS • CRUDE GLYCERINE

AMONG THEIR USES

HAIR SHAMPOOS
STEPANOL WA, WAT • MAYPON 4C, 4CT
POLYPEPTIDE 37 • NINOL AA-62 EXTRA • STEPAN T-6-

LIQUID DETERGENTS
STEPAN LD-55A • STEPAN DS-60
NINOL AA-62 OR AA-62 EXTRA
STEPANOL B-153 • MAKON 10 • NINEX 26

SYNTHETIC FLOOR CLEANERS AND WAX STRIPPER
NINOL 1301 • NINOL 1281 • STEPAN HDA-7 • NINEX 3(

STEAM CLEANERS, WHITE WALL TIRE CLEANERS
NINEX 24 • MAYPON SK

DEGREASERS
NINATE 411 • NINOL 201 • MAKON BXA, BXK

RUG SHAMPOOS
STEPANOL T-28 • MAYPON SK • STEPAN LIPA

CLEANER SANITIZERS
MAKON 10 • NINOL 1301

WATERLESS HAND CLEANERS
EMULSIFIER WHC

AGRICULTURAL SPRAYS
TOXIMUL R & S • TOXIMUL LF • MAYPON K

HEAVY DUTY LIQUIDS
STEPANATE T AND K • MAYPON SK
STEPAN DT-20 • AMIDOX C-2

ALL-PURPOSE LIQUID HOUSEHOLD CLEANERS
NINOL 1301 • STEPAN DS-60 • NINOL 1281

CUTTING FLUIDS
STEPAN C-65, C-68 • MAKON BXK, BXA • NINOL 201

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WAREHOUSE STOCKS: Maywood, New Jersey • Tampa • Atlanta • Chicago
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EMICAL COMPANY

SURFACTANT

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. . . we know which way we're going. Follow our symbol of equilibrium.

The following is a partial list of the many and versatile SURFACE ACTIVE AGENTS produced by SOLE CHEMICAL CORPORATION.

SOLE-ONIC **CDS**—S.E. Diglycol Laurate emulsifier defoamer.
MI—Distilled—Isopropyl Myristate.
PI—Distilled—Isopropyl Palmitate.
PGO—Fluid Fatty Glyceride Ester emulsifier-defoamer.
PH-1—Crystalline acid inhibitor.
TMG(P)—Mono-diglyceride emulsifier.

SOLE-MULSE **B**—Hydrocarbon solvent (degreaser) emulsifier.
SK-1—Hydrocarbon solvent (Hand Cleaner) solubilizer.
PD-2—Phosphatizer—degreaser emulsifier.
ODB-2—Orthodichlorobenzene emulsifier.

SOLE-TERGE **A-90**—Dishtergent Super Concentrate for Aerosols.
NE Series—Ethoxylated Nonyl Phenols.
OE Series—Ethoxylated Octyl Phenols.
NSN—Na Lauryl Sulfate—needles.
OW Series—High M.W. demulsifiers.
TOE—Tall Oil Ethoxylate—controlled suds detergent emulsifier.
TS-2-S—Na-2 Ethyl Hexyl Sulfate wetter-penetrant.
8—Fatty Amide Sulfate (bubble bath) foamer.
41—Defoamer.
51—Coco Fatty Alkanolamide—detergent, foamer, thickener.
58—Lauric Alkanolamide—foam stabilizer, thickener.
59K—Oil Soluble emulsifier.
60—High Foam Stabilized Anionic Concentrate Detergent Base.
311—Na Sulfated Alcohol Ethoxylate — shampoo, detergent foamer.
315—TEA Sulfated Alcohol Ethoxylate—shampoo, detergent, foamer base.

SOLE-FONATE Series—Dodecyl Benezene Sulfonic acid and salts—low salt type.

SOLE-SOLVE ISP—Odorless Isoparaffin solvent.

Send your inquiry to the SOLE technical sales representative in your area, or directly to:

SOLE Chemical Corporation

7740 So. SOUTH CHICAGO AVE., CHICAGO 19, ILLINOIS

Phone: SAginaw 1-1792 Cable: SOLECHEM

DETERGENT INTERMEDIATES (Cont'd.)

Amoco Chems. Corp., 130 E. Randolph Dr., Chicago
Antara Chemicals, 435 Hudson St., N. Y.
Archer Daniels Midland Co., Minneapolis 2
Armour Industrial Chem. Co., 110 N. Wacker Dr., Chicago
Atlantic Refining Co., 260 S. Broad St., Philadelphia 1
Barlow Chem. Corp., Ossining, N. Y.
Chemical Concentrates, Ft. Washington, Pa.
Continental Chem. Co., 195 21 Ave., Paterson, N. J.
Continental Oil Co., 1270 Av. of Americas, N. Y. 20
Dehydag Deutsche Hydrierwerke, Henkelstrasse 67, Dusseldorf, Germany
E. I. du Pont de Nemours & Co., Wilmington, Dela.
Enjay Chemical Co., 15 W. 51st St., N. Y. 19
Finetex, Inc., 418 Falmouth Ave., Paterson, N. J.
Food Machy. & Chem. Corp., 161 E. 42 St., N. Y.
Geigy Industrial Chems., Ardsley, N. Y.
Glidden Co., Jacksonville 1, Fla.
Gulf Oil Corp., 360 Lexington Ave., N. Y. 17
Jefferson Chem. Co., 1121 Walker Ave., Houston, Tex.
Krystall Chem. Co., 1301 W. Belden Ave., Chicago
Marchon Prods., Ltd., Whitehaven, Cumberland, England
M. Michel & Co., 90 Broad St., N. Y. 4
Monsanto Chemical Co., St. Louis, Mo.
Olin Mathieson Chem. Corp., Organic Chems., 745 5 Ave., N. Y.
Onyx Chemical Corp., Warren & Morris Sts., Jersey City, N. J.
Oronite Div., Calif. Chem. Co., 200 Bush St., San Francisco 20
Pennsalt Chems. Corp., 3 Penn Center, Phila.
Petrochemicals Co., 420 Lexington Ave., N. Y. 17
Pilot Chem. Co., 11756 Burke St., Santa Fe Springs, Calif.
Pitt-Consol Chem. Co., 191 Doremus Ave., Newark, N. J.
Process Chems. Co., 8733 S. Dice Rd., Santa Fe Springs, Calif.
Robeco Chemicals, Inc., 25 E. 26th St., N. Y. 10
Shell Chemical Corp., 50 W. 50th St., N. Y. 20
Sole Chem. Corp., 7740 S. Chicago Ave., Chicago 19
Sonneborn Chem. & Refin'g. Corp., 300 4th Ave., N. Y. 10
Stauffer Chem. Co., 380 Madison Ave., N. Y.
Stepan Chem. Co., 427 W. Randolph St., Chicago
Surfact-Co., Inc., P. O. Box 114, Blue Island, Ill.
Swift & Co., Hammond, Ind.
Tanatex Chem. Corp., Belleville Turnpike, Kearny, N. J.
Textilana Corp., 12607 Cerise Ave., Hawthorne, N. J.
Treplow Chemical Co., 100 New St., Paterson, N. J.
Ultra Chem. Wks., 2 Wood St., Paterson, N. J.
Union Carbide Chems. Co., 270 Park Ave., N. Y.
Van Dyk & Co., Belleville 9, N. J.
Victor Chem. Wks., 155 N. Wacker Dr., Chicago 6
Witco Chem. Corp., 122 E. 42nd St., N. Y. 17

DETERGENT PLANT ENGINEERING (see Engineering)

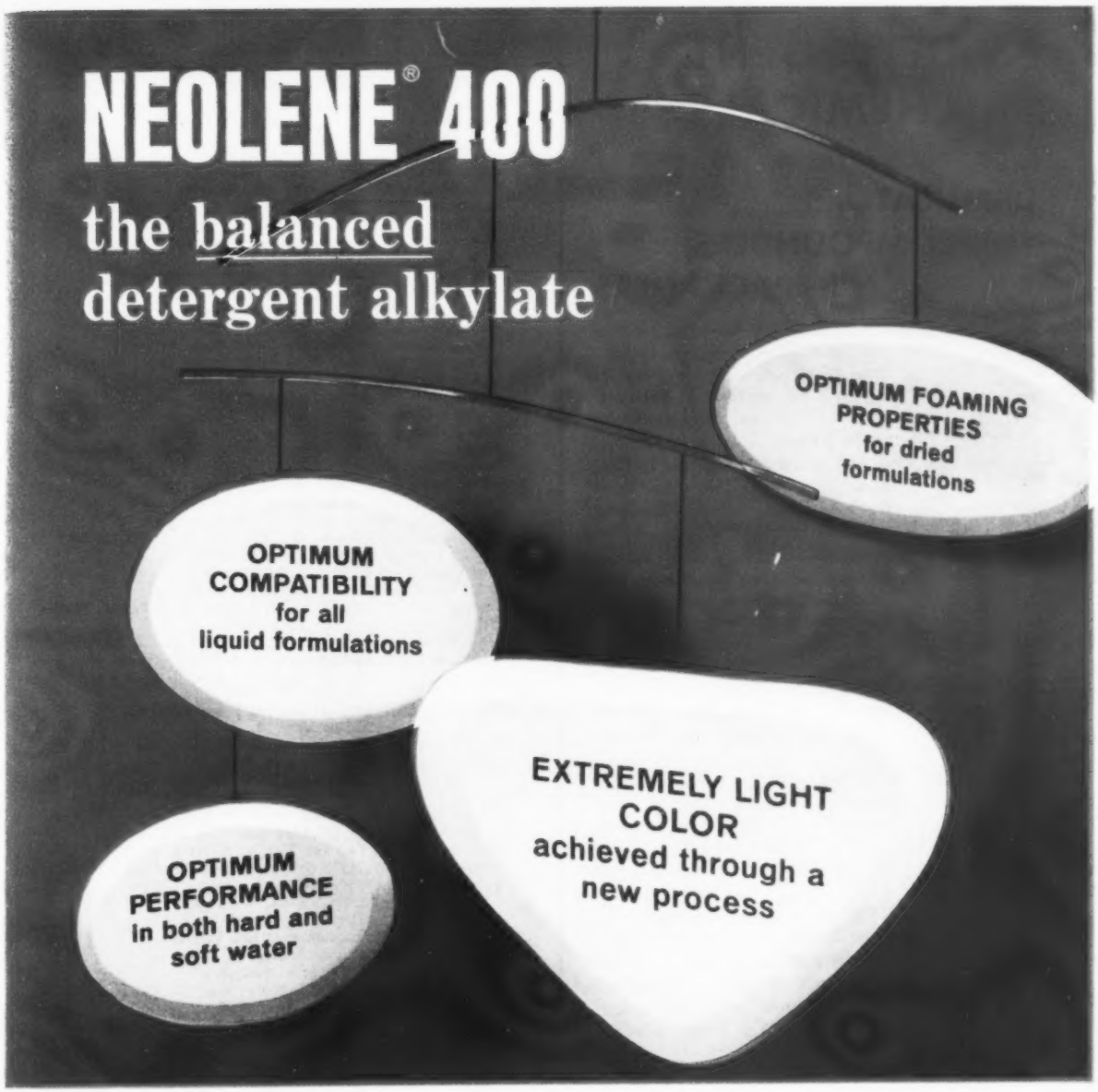
DETERGENT SOLUTIONIZERS, for dispensing detergent and soap solutions ready for use (see Soap Solutionizers)

DETERGENT SPRAY TOWERS

Bowen Engineering, Inc., 10 Station Rd., North Branch, N. J.
G. Mazzoni, Busto Arsizio, Italy
John W. McCutcheon, Inc., 236 Mt. Kemble Ave., Morristown, N. J.
Meccaniche Moderne, Corso Sempione 51, Busto Arsizio, Italy
Foster D. Snell, Inc., 29 W. 15th St., N. Y. 11
Wurster & Sanger, Inc., 5201 S. Kenwood Ave., Chicago

DETERGENTS (Alkali Type)

ABC Compounding Co., Oakcliff & Harwell Rds., SW, Atlanta, Ga.
Allied Chem. Corp., Solvay Process Div., 61 Broadway, N. Y.
Almo Laboratories Co., 424 Madison Ave., N. Y. 17
American Agricultural Chem. Co., 100 Church St., N. Y.
Armour & Co., 1355 W. 31st St., Chicago 9
Atlantic Refining Co., 260 S. Broad St., Phila.
B & W Chemical Co., 25920 Belle Porte, Harbor City, Calif.
Baird & McGuire, Inc., Holbrook, Mass.
Blockson Chemicals, Joliet, Ill.
Buckingham Wax Co., 51-03 Van Dam St., LIC, N. Y.
Britex Corp., 17 Lewis Wharf, Boston
Chicago Sanitary Prods. Co., 3100 S. Throop St., Chicago 8
Chem. Service Co. of Balto., Howard & West Sts., Balto.
Clarkson Laboratories, 1470 Ferry St., Camden, N. J.
Concord Chem. Co., 205 S. 2 St., Camden, N. J.
Continental Chemical Co., 195 21 Ave., Paterson, N. J.
Cowles Chemical Co., 7016 Euclid Ave., Cleveland
Dehydag Deutsche Hydrierwerke, Dusseldorf, Germany
Diamond Alkali Co., Union Commerce Bldg., Cleveland
E. I. du Pont de Nemours & Co., Wilmington


NEOLENE® 400
the balanced
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OPTIMUM FOAMING PROPERTIES for dried formulations
OPTIMUM COMPATIBILITY for all liquid formulations
EXTREMELY LIGHT COLOR achieved through a new process
OPTIMUM PERFORMANCE in both hard and soft water

NEOLENE 400 continues to be the intermediate relied upon by the world's leading manufacturers of liquid and dry anionic detergents. NEOLENE 400 is an alkyl aryl hydrocarbon with an apparent molecular weight of 240. Extensive tests indicate that branch chain alkylates with a molecular weight in the 230 to 240 range give the most satisfactory balance of the factors important in the finished product: high detergency, rinseability, wetting and low hygroscopicity.

We are prepared to discuss at length with you our research data and certain conclusions which could be of vital importance to you in your formulations.

Tailor-made NEOLENE 400 is the most satisfactory all-round detergent intermediate manufactured *anywhere* today.

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DETERGENT CHEMICALS
for
FORMULATORS, COMPOUNDERS, PACKAGERS

ARDET AB CONC. POWDER — 84-87% active sodium dodecyl benzene sulfonate. Relatively dust free, reducing sealing problems encountered in foil or film envelope packaging.

ARDET AB CONC. FLAKE — 84-87% active sodium dodecyl benzene sulfonate. Density .34 - .36, light color and odor.

ARDET AB-40 GRANULAR — 40% active sodium dodecyl benzene sulfonate. Unusual particle form, very suitable for making uniform mixes with alkali and phosphate, density .55 - .6.

ARDET AB-40 FLAKES — 40% active sodium dodecyl benzene sulfonate. Light in color, low in odor. Density .4 - .45.

ARDET AB-40 POWDER — 40% active sodium dodecyl benzene sulfonate. For even distribution of low percentages of wetting agents. 100% thru 50 mesh screen, 90% on 120.

ARDET A-25 — 25% active alkyl aryl sulfonate, light in color, brilliantly clear, with low cloud point.

ARDET AN LIQUID — Blend of alkyl aryl sulfonates and non-ionics, for excellent performance at low concentrations.

ARDET CB — An economical liquid base for the formulation of all-purpose and hard surface cleaners.

ARDET DC — 97-98% coconut oil diethanolamine condensate. High purity condensate which gives unusually good performance. Very light in color.

ARDET DS — Modified coconut oil diethanolamide condensate, having exceptional wetting and detergent properties at low cost.

Please write or phone for detailed information, specifications, and quotations on these and other detergent chemicals.

ARDMORE CHEMICAL CO., Inc.
DETERGENT CHEMICALS

840 Valley Brook Ave. Lyndhurst, N. J.

DETERGENTS (Alkali Type) (Cont'd.)

East Coast Soap Corp., 89 Coffey St., Bklyn. 31
Emkay Chem. Co., Elizabeth 1, N. J.
Essential Chemicals Co., 5906 N. Port Washington Rd., Milwaukee
Finetex, Inc., 418 Falmouth Ave., East Paterson, N. J.
Fuld Bros., 702 S. Wolfe St., Baltimore, Md.
J. Chemical Wks., 602 W. 37th St., N. Y.
Help, Inc., 122 W. Kinzie St., Chicago
Hysan Prods. Co., 930 W. 38th Place, Chicago
Jones-Hamilton Co., 455 Wells Ave., Newark, Calif.
Kamen Soap Prods. Co., 5-22 50 Ave., L. I. C., N. Y.
Klix Chem. Co., 551 Railroad Ave., S. San Francisco
Marchon Prods. Ltd., Whitehaven, Cumberland, England
M. Michel & Co., 90 Broad St., N. Y.
Moss Soap Co., Pinellas Int'l Airport, St. Petersburg, Fla.
National Milling & Chem. Co., 4601 Flat Rock Rd., Phila.
Olin Mathieson Chem. Corp., Ind. Chems., Baltimore 3
Peck's Products, 610 E. Clarence Ave., St. Louis
Pennsalt Chems. Corp., 3 Penn Center Plaza, Phila.
Philadelphia Quartz Co., 1056 Public Ledger Bldg., Phila.
S. & S. Soap Co., 815 E. 135th St., N. Y. 54
Sonneborn Chem. & Refin'g Corp., 300 4th Ave., N. Y. 10
Southern Chemical Prods. Co., 170 Poplar St., Macon, Ga.
John T. Stanley Co., 642 W. 30th St., N. Y.
Stepan Chem. Co., 427 W. Randolph St., Chicago
Swift & Co., Chicago 9
Tex-ite Prods. Corp., 859 E. 43 St., Brooklyn 10
Textilana Corp., 12607 Cerise Ave., Hawthorne, Calif.
Theobold Industries, P. O. Box 72, Harrison, N. J.
Thompson-Hayward Chem. Co., 2915 SW Blvd., Kansas City
Treplow Chemical Co., 100 New St., Paterson, N. J.
Ultra Chem. Wks., 2 Wood St., Paterson, N. J.
Victor Chemical Wks., 155 N. Wacker Dr., Chicago
Virginia-Carolina Chem. Corp., 501 E. Main St., Richmond, Virginia
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13
Witco Chem. Co., 122 E. 42 St., N. Y.
Wyandotte Chemicals Corp., J. B. Ford Div., Wyandotte, Mich.

DETERGENTS, SYNTHETIC (Anionic), alkyl aryl sulfonates

Allied Chem. Corp., National Aniline Div., 40 Rector St., N. Y.
Antara Chemicals, 435 Hudson St., N. Y.
Ardmore Chem. Co., 840 Valley Brook Ave., Lyndhurst, N. J.
Armour & Co., 1355 W. 31st St., Chicago 9
Atlantic Refining Co., 260 S. Broad St., Phila. 1
Colgate-Palmolive Co., 300 Park Ave., N. Y. 22
Continental Chem. Co., 195 21 Ave., Paterson, N. J.
Continental Oil Co., 1270 Ave. of Americas, N. Y. 20
Dehydag Deutsche Hydrierwerke, Dusseldorf, Germany
E. I. du Pont de Nemours & Co., Wilmington
Emkay Chem. Co, 319 2nd St., Elizabeth, N. J.
Finetex, Inc., 418 Falmouth Ave., East Paterson, N. J.
Geigy Industrial Chemicals, Ardsley, N. Y.
Intex Chem. Corp., 167 Main St., Lodi, N. J.
Krystall Chem. Co., 1301 W. Belden Ave., Chicago 14
Lever Brothers Co., 390 Park Ave., N. Y. 22
Marchon Prods. Ltd., Whitehaven, Cumberland, England
M. Michel & Co., 90 Broad St., N. Y. 4
Mona Industries, 65 E. 23rd St., Paterson, N. J.
Monsanto Chem. Co., St. Louis, Mo.
Oronite Div., Calif. Chem. Co., 200 Bush St., San Francisco 20
Pilot Chem. Co., 11756 Burke St., Santa Fe Springs, Calif.
Process Chems. Co., 8733 S. Dice Rd., Santa Fe Springs, Calif.
Procter & Gamble Dist. Co., Cincinnati
Sole Chem. Corp., 7740 S. Chicago Ave., Chicago 19
Sonneborn Chem. & Refining Corp., 300 Park Ave. 5, N. Y.
Stepan Chem. Co., 427 W. Randolph St., Chicago
Surfact-Co., Inc., Box 114, Blue Island, Ill.
Swift & Co., Chicago 9
Tanatex Chem. Corp., Belleville Turnpike, Kearny, N. J.
Tennessee Corp., 617 Grant Bldg., Atlanta, Ga.
Textilana Corp., 12607 Cerise Ave., Hawthorne, Calif.
Treplow Chemical Co., 100 New St., Paterson, N. J.
Ultra Chem. Wks., 2 Wood St., Paterson, N. J.
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13
Witco Chem. Co., 122 E. 42nd St. N. Y. 17

DETERGENTS, SYNTHETIC (Amphoteric), general

Antara Chemicals, 435 Hudson St., N. Y.
E. I. du Pont de Nemours & Co., Wilmington
Finetex, Inc., 418 Falmouth Ave., East Paterson, N. J.
General Mills, Chem. Div., Kankakee, Ill.
M. Michel & Co., 90 Broad St., N. Y. 4
Miranol Chem. Co., 277 Coit St., Irvington, N. J.
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Treplow Chemical Co., 100 New St., Paterson, N. J.
Witco Chem. Co., 122 E. 42nd St., N. Y. 17

DETERGENTS, SYNTHETIC (Anionic), alkyl sulfates

American Alcolac Corp., 3440 Fairfield Rd., Baltimore 26
American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
American International Prod. Corp., 138 Liberty St., N. Y. 6
Continental Chem. Co., 195 21 Ave., Paterson, N. J.
Dehydag Deutsche Hydrierwerke, Henkelstrasse 67, Dusseldorf, Germany
E. I. du Pont de Nemours & Co., Wilmington, Dela.
Emkay Chem. Co., 319 2nd St., Elizabeth, N. J.
Finetex, Inc., 418 Falmouth Ave., East Paterson, N. J.
Geigy Industrial Chemicals, Ardsley, N. Y.
Intex Chem. Corp., 167 Main St., Lodi, N. J.
Kamen Soap Prods. Co., 5-22 50 Ave., L. I. C. 1, N. Y.
Krystall Chem. Co., 1301 W. Belden Ave., Chicago 14
Marchon Prods., Inc., Whitehaven, Cumberland, England
M. Michel & Co., 90 Broad St., N. Y. 4
Mona Industries, Inc., 65 E. 23rd St., Paterson, N. J.
Onyx Chemical Corp., Warren & Morris Sts., Jersey City 2, N. J.
Oronite Div., Calif. Chem. Co., 200 Bush St., San Francisco
Process Chems. Co., 8722 S. Dice Rd., Santa Fe Springs, Calif.
Procter & Gamble Dist. Co., Cincinnati
Rozilda Laboratories, 55-18 Purvis St., L. I. C., N. Y.
Sole Chem. Corp., 7740 S. Chicago Ave., Chicago 19
Stepan Chemical Co., 427 W. Randolph St., Chicago
Surfact-Co., Inc., P. O. Box 114, Blue Island, Ill.
Swift & Co., Chicago
Textilana Corp., 12607 Cerise Ave., Hawthorne, Calif.
Treplow Chemical Co., 100 New St., Paterson, N. J.
Union Carbide Chems. Co., 270 Park Ave., N. Y.
Van Dyk & Co., Belleville 9, N. J.
Witco Chem. Co., 122 E. 42 St., N. Y. 17

DETERGENTS, SYNTHETIC (Anionic), alkyl sulfonates

Allied Chem. Corp., National Aniline Div., 40 Rector St., N. Y.
American Alcolac Corp., 3440 Fairfield Rd., Baltimore
Antara Chemicals, Div. GAF, 435 Hudson St., N. Y.
Amour & Co., 1355 W. 31st St., Chicago
Barlow Chem. Corp., Ossining, N. Y.
Ciba Co., Fair Lawn, N. J.
Continental Chem. Co., 195 21 Ave., Paterson, N. J.
Dow Chemical Co., Midland, Mich.
E. I. du Pont de Nemours & Co., Wilmington
Emkay Chem. Co., 319 2nd St., Elizabeth N. J.
Finetex, Inc., 418 Falmouth Ave., East Paterson, N. J.
Intex Chem. Corp., 167 Main St., Lodi, N. J.
Kamen Soap Prods. Co., 5-22 50 Ave., L. I. C. 1, N. Y.
Klix Chem. Co., 551 Railroad Ave., S. San Francisco
M. Michel & Co., 90 Broad St., N. Y. 4
Oronite Div., Calif. Chem. Co., 200 Bush St., San Francisco
Petrochemicals Co., 420 Lexington Ave., N. Y. 17
Piolt Chem. Co., 11756 Burke St., Santa Fe Springs, Calif.
Quaker Chem. Prods. Corp., Conshohacken, Pa.
Rosilda Laboratories, 44-18 Purvis St., L. I. C., N. Y.
Sole Chem. Corp., 7740 S. Chicago Ave., Chicago 19
Stepan Chem. Co., 427 W. Randolph St., Chicago
Tanatex Chem. Corp., Belleville Turnpike, Kearny, N. J.
Textilana Corp., 12607 Cerise Ave., Hawthorne, Calif.
Treplow Chem. Co., 100 New Street, Paterson, N. J.

DETERGENTS, SYNTHETIC (Anionic), sulfated and sulfonated amides and amides

American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
Antara Chemicals, 435 Hudson St., N. Y. 14
Ciba Co., Fair Lawn, N. J.
Continental Chem. Co., 195 21 Ave., Paterson, N. J.
Dehydag Deutsche Hydrierwerke, Dusseldorf, Germany
E. F. Drew & Co., 15 E. 26 St., N. Y. 10
E. I. du Pont de Nemours & Co., Wilmington
Emkay Chem. Co., 319 2nd St., Elizabeth, N. J.
Finetex, Inc., 418 Falmouth Ave., East Paterson, N. J.
Intex Chem. Corp., 167 Main St., Lodi, N. J.
Kamen Soap Prods. Co., 5-22 50 Ave., L. I. C. 1, N. Y.
Krystall Chem. Co., 1301 W. Belden Ave., Chicago 14
Marchon Prods., Whitehaven, Cumberland, England
M. Michel & Co., 90 Broad St., N. Y. 4
Miranol Chem. Co., 277 Coit St., Irvington, N. J.

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Quaker Chem. Prods. Corp., Conshohocken, Pa.
Sole Chem. Corp., 7740 S. Chicago Ave., Chicago 19
Swift & Co., Chicago
Textilana Corp., 12607 Cerise Ave., Hawthorne, Calif.
Treplow Chemical Co., 100 New St., Paterson, N. J.
Van Dyk & Co., Belleville 9, N. J.
Witco Chem. Co., 122 E. 42nd St., N. Y. 17

DETERGENTS, SYNTHETIC (Anionic), Miscellaneous types

Allied Chem. Corp., National Aniline Div., 40 Rector St., N. Y.
American Alcolac Corp., 3440 Fairfield Rd., Baltimore
American International Prod. Corp., 138 Liberty St., N. Y. 6
Ardmore Chem. Co., 840 Valley Brook Ave., Lyndhurst, N. J.
Armour & Co., 1355 W. 31st St., Chicago
Ciba Co., Fair Lawn, N. J.
Colgate-Palmolive Co., 300 Park Ave., N. Y.
Continental Chem. Co., 195 21 Ave., Paterson, N. J.
Continental Oil Co., 1270 Ave. of Americas, N. Y. 20
Dehydag Deutsche Hydrierwerke, Dusseldorf, Germany
E. F. Drew & Co., 15 E. 26 St., N. Y. 10
E. I. du Pont de Nemours & Co., Wilmington, Del.
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Finetex, Inc., 418 Falmouth Ave., East Paterson, N. J.
Hewitt Soap Co., 333 Linden Ave., Dayton 3, O.
Intex Chem. Corp., 167 Main St., Lodi, N. J.
Knapp Products, Inc., Lodi, N. J.
Krystall Chem. Co., 1301 W. Belden Ave., Chicago 14
Marchon Prods., Ltd., Whitehaven, Cumberland, England
M. Michel & Co., 90 Broad St., N. Y. 4
Miranol Chem. Co., 277 Coit St., Irvington, N. J.
Nopco Chem. Co., 60 Park Pl., Newark, N. J.
Onyx Chemical Corp., Warren & Morris Sts., Jersey City 2, N. J.
Petrochemicals Co., 420 Lexington Ave., N. Y. 17
Pilot Chemical Co., 11756 Burke St., Santa Fe Springs, Calif.
Procter & Gamble Dist. Co., Cincinnati
Refined Products, Inc., 624 Schuyler Ave., Lyndhurst, N. J.
Rohm & Haas Co., Washington Sq., Phila.
Sandoz, Inc., 61 Van Dam St., N. Y. 13
Sole Chem. Corp., 7740 S. Chicago Ave., Chicago 19
Stepan Chemical Co., 427 W. Randolph St., Chicago
Surfact-Co., Inc., Box 114, Blue Island, Ill.
Swift & Co., Chicago
Tanatex Chem. Corp., Belleville Turnpike, Kearny, N. J.
Tennessee Corp., 617 Grand Bldg., Atlanta, Ga.
Textilana Corp., 12607 Cerise Ave., Hawthorne, Calif.
Treplow Chemical Co., 100 New St., Paterson, N. J.
Ultra Chem. Wks., 2 Wood St., Paterson, N. J.
Victor Chem. Wks., 155 N. Wacker Dr., Chicago 6
Witco Chem. Co., 122 E. 42nd St., N. Y.

DETERGENTS, SYNTHETIC (Cationic), general

American Alcolac Corp., 3440 Fairfield Rd., Baltimore
Antara Chemicals, 435 Hudson St., N. Y.
Archer-Daniels-Midland Co., Minneapolis
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Barlow Chem. Corp., Ossining, N. Y.
Continental Oil Co., 1270 Av. of Americas, N. Y. 20
Dehydag Deutsche Hydrierwerke, Dusseldorf, Germany
E. F. Drew & Co., 15 E. 26 St., N. Y. 10
E. I. du Pont de Nemours & Co., Wilmington
Emkay Chem. Co., 319 2nd Ave., Elizabeth, N. J.
Fine Organics, Inc., 205 Main St., Lodi, N. J.
Geigy Industrial Chemicals, Ardsley, N. Y.
Hodag Chem. Corp., 7247 N. Central Park, Chicago
Intex Chem. Corp., 167 Main St., Lodi, N. J.
Kamen Soap Prods. Co., 5-22 50 Ave., L. I. C. 1, N. Y.
Knapp Prods., Inc., Lodi, N. J.
M. Michel & Co., 90 Broad St., N. Y. 4
Miranol Chem. Co., 277 Coit St., Irvington, N. J.
Nalco Chem. Co., 6216 W. 66 Pl., Chicago
Nopco Chem. Co., 60 Park Pl., Newark 1, N. J.
Onyx Chemical Corp., Warren & Morris Sts., Jersey City 2, N. J.
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Sole Chem. Corp., 7740 S. Chicago Ave., Chicago 19
Tanatex Chem. Corp., Belleville Turnpike, Kearny, N. J.
Textilana Corp., 12607 Cerise Ave., Hawthorne, Calif.
Treplow Chemical Co., 100 New St., Paterson, N. J.
Joseph Turner & Co., Ridgefield, N. J.
Victor Chem. Wks., 155 N. Wacker Dr., Chicago 6
Wilson-Martin Div., Snyder & Swanson St., Phila.
Witco Chem. Co., 122 E. 42nd St., N. Y.

DETERGENTS, SYNTHETIC (Cationic), for bacteriocidal uses

Antara Chemicals, 435 Hudson St., N. Y. 14
Archer-Daniels-Midland Co., Minneapolis
Armour Ind. Chem. Co., 110 N. Wacker Dr., Chicago
Barlow Chem. Corp., Ossining, N. Y.
E. I. du Pont de Nemours & Co., Wilmington
Emkay Chem. Co., 319 2nd St., Elizabeth, N. J.
Fine Organics, Inc., 205 Main St., Lodi, N. J.
Geigy Industrial Chemicals, Ardsley, N. Y.
Intex Chem. Corp., 167 Main St., Lodi, N. J.
Miranol Chem. Co., 277 Coit St., Irvington, N. J.
M. Michel & Co., 90 Broad St., N. Y. 4
Nalco Chem. Co., 6216 W. 66 Pl., Chicago
Onyx Chemical Corp., Warren & Morris Sts., Jersey City 2, N. J.
Ottawa Chem. Co., 823 Hamilton St., Toledo 7, O.
Process Chems. Co., 8733 S. Dice Rd., Santa Fe Springs, Calif.
Procter & Gamble Dist. Co., Cincinnati
Rohm & Haas Co., 222 W. Washington Sq., Phila.
Rozilda Laboratories, 44-18 Purvis St., L. I. C., N. Y.
Sole Chem. Corp., 7740 S. Chicago Ave., Chicago 19
Sterwin Chemicals, Inc., 1450 Broadway, N. Y. 18
Tanatex Chem. Corp., Belleville Turnpike, Kearny, N. J.
Textilana Corp., 12607 Cerise Ave., Hawthorne, Calif.
Joseph Turner & Co., Ridgefield, N. J.
Wilson-Martin Div., Snyder and Swanson St., Phila.
Witco Chem. Co., 122 E. 42nd St., N. Y.

DETERGENTS, SYNTHETIC (Finished), powder, low-sudsing

ABC Compounding Co., Oakcliff & Harwell Rds., S.W., Atlanta, Ga.
Armour & Co., 1355 W. 31st St., Chicago 9
Averil, Inc., 6780 NW 37 Ct., Miami, Fla.
B & W Chem. Co., 25920 Belle Porte Ave., Harbor City, Calif.
Britex Corp., 17 Lewis Wharf, Boston
Chem. Service of Balto., Howard & Wests Sts., Balto.
Clarkson Laboratories, 1450 Ferry Ave., Camden, N. J.
Colgate-Palmolive Co., 300 Park Ave., N. Y. 22
Continental Chem. Co., 195 21 Ave., Paterson, N. J.
Dettelbach Chem. Corp., 4111 Peachtree Rd., Atlanta 19
East Coast Soap Corp., 89 Coffey St., Bklyn. 31
Emkay Chem. Co., 319 2nd St., Elizabeth, N. J.
Essential Chems. Co., 2200 N. 32nd St., Milwaukee 8
Freesmeier Laboratories, 3661 Windsor Pl., St. Louis 13
Frontier Chem. Products, Inc., 119 E. Soper St., St. Louis 11
Help Inc., 122 W. Kinzie St., Chicago
Hewitt Soap Co., 333 Linden Ave., Dayton, O.
Industrial Materials Co., 1017 McCall St., Houston
J. Chem. Corp., 437—11th Ave., N. Y. 18
Kamen Soap Prods. Co., 5-22 50 Ave., L. I. C. 1, N. Y.
Klenzade Prods., Beloit, Mich.
Klix Chem. Co., 551 Railroad Ave., S. San Francisco
National Milling & Chem. Co., 4601 Flat Rock Rd., Phila.
G. H. Packwood Mfg. Co., 1545 Tower Grove Ave., St. Louis
Peck's Prods. Co., 610 E. Clarence Ave., St. Louis 15
Peerless Chem. Co., 1300-02 N. Fulton Ave., Baltimore
Petrochemicals Co., 420 Lexington Ave., N. Y. 20
Puro Co., 2801 Locust St., St. Louis, Mo.
S. & S. Soap Co., 815 E. 135th St., N. Y. 54
Southern Chem. Products Co., 170 Poplar St., Macon, Ga.
John T. Stanley Co., 642 W. 30 St., N. Y.
Swift & Co., Chicago
Tex-ite Prods. Corp., 859 E. 43 St., Brooklyn 10
Ultra Chem. Wks., 2 Wood St., Paterson, N. J.
Virginia-Carolina Chem. Corp., 401 E. Main St., Richmond, Va.
Witco Chem. Co., 122 E. 42nd St., N. Y. 17

DETERGENTS, SYNTHETIC (Finished), powder, sudsing

ABC Compounding Co., Oakcliff & Harwell Rds., S.W., Atlanta, Ga.
Armour & Co., 1355 W. 31st St., Chicago 9
Averil, Inc., 6780 NW 37 Ct., Miami, Fla.
B & W Chem. Co., 25920 Belle Porte Ave., Harbor City, Calif.
Britex Corp., 17 Lewis Wharf, Boston
Chicago Sanitary Prod. Co., 3100 S. Throop St., Chicago 8
Chem. Service of Balto., Howard & West Sts., Balto.
Clarkson Laboratories, 1530 Ferry Ave., Camden, N. J.
Colgate-Palmolive Co., 300 Park Ave., N. Y. 22
Continental Chem. Co., 195 21 Ave., Paterson, N. J.
Dettelbach Chem. Corp., 4111 Peachtree Rd., Atlanta 19
East Coast Soap Corp., 89 Coffey St., Bklyn. 31
Emkay Chem. Co., 319 2nd St., Elizabeth, N. J.
Essential Chemicals Co., 5906 N. Port Washington Rd., Milwaukee
Freesmeier Laboratories, 3661 Windsor Pl., St. Louis 13
Frontier Chem. Prods. Inc., 119 E. Soper St., St. Louis 11
Help, Inc., 122 W. Kinzie St., Chicago
Hewitt Soap Co., 333 Linden Ave., Dayton 3, O.
Hysan Prods. Co., 930 W. 38th Place, Chicago
Industrial Materials Co., 1017 McCall St., Houston
Kamen Soap Prods. Co., 5-22 50 Ave., L. I. C. 1, N. Y.
Klenzade Prods., Beloit, Mich.
Klix Chem. Co., 551 Railroad Ave., S. San Francisco
Lever Brothers Co., 390 Park Ave., N. Y. 22
M. Michel & Co., 90 Broad St., N. Y. 4
Moss Soap Co., Pinellas Int'l. Airport, St. Petersburg, Fla.
National Milling & Chem. Co., 4601 Flat Rock Rd., Phila.
Peck's Prods. Co., 610 E. Clarence Ave., St. Louis 15
Peerless Chem. Co., 1300-02 N. Fulton Ave., Baltimore
Petrochemicals Co., 420 Lexington Ave., N. Y. 17
Pilot Chemical Co., 11756 Burke St., Santa Fe Springs, Calif.
Procter & Gamble Dist. Co., Cincinnati
Purex Corp., 9300 Rayo Ave., South Gate, Calif.
Puro Co., 2801 Locust St., St. Louis, Mo.
Southern Chemical Products Co., 170 Poplar St., Macon, Ga.
John T. Stanley Co., 642 W. 31 St., N. Y.
Geo. Stearns Chem. Corp., 4200 S. Mendota St., Madison, Wisc.
Surety Laboratories, 3946 Olive St., St. Louis 8
Swift & Co., Chicago 9
Tex-ite Prods. Corp., 859 E. 43 St., Brooklyn 10
Treplow Chemical Co., 100 New St., Paterson, N. J.
James Varley & Sons, 1200 Switzer Ave., St. Louis
Virginia-Carolina Chem. Corp., 401 E. Main St., Richmond, Va.
Ultra Chem. Wks., 2 Wood St., Paterson, N. J.
Witco Chem. Co., 122 E. 42nd St., N. Y. 17

DETERGENTS, SYNTHETIC (Finished), liquid, low-sudsing

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Armour & Co., 1355 W. 31st St., Chicago 9
Averil, Inc., 6780 NW 37 Ct., Miami, Fla.
B & W Chem. Co., 25920 Belle Porte Ave., Harbor City, Calif.
Baird & McGuire, Inc., Holbrook, Mass.
Bixon Chem. Corp., 1163 Southern Blvd., N. Y. 59
Britex Corp., 17 Lewis Wharf, Boston
Chemical Concentrates, Ft. Washington, Pa.
Chem. Service of Balto., Howard & West Sts., Balto. 30
Clarkson Laboratories, 1470 Ferry St., Camden, N. J.
Colgate-Palmolive Co., 300 Park Ave., N. Y. 22
Continental Chem. Co., 195 21 Ave., Paterson, N. J.
Dehydag Deutsche Hydrierwerke, Dusseldorf, Germany
Dura Wax Co., McHenry, Ill.
East Coast Soap Corp., 89 Coffee St., Bklyn. 31
Essential Chems. Co., 5906 N. Port Washington Rd., Milwaukee
Emkay Chem. Co., 319 2nd St., Elizabeth, N. J.
Finetex, Inc., 418 Falmouth Ave., East Paterson, N. J.
Frontier Chem. Prods., Inc., 119 E. Soper St., St. Louis 11
Fuld Bros., Inc., 702 S. Wolfe St., Baltimore 31
Haag Laboratories, 14000 S. Seeley, Blue Island, Ill.
Hewitt Soap Co., Dayton, O.
Hysan Prods. Co., 930 W. 38th Place, Chicago
Industrial Materials Co., 1017 McCall St., Houston
Kamen Soap Prods. Co., 5-22 50 Ave., L. I. C. 1, N. Y.
Klix Chem. Co., 551 Railroad Ave., S. San Farncisco
Marchon Prods., Ltd., Whitehaven, Cumberland, Eng.
M. Michel & Co., 90 Broad St., N. Y. 4
National Milling & Chem. Co., 4601 Flat Rock Rd., Phila. 27
Onyx Chemical Corp., Warren & Morris Sts., Jersey City 2, N. J.
Peck's Prod's. Co., 610 E. Clarence Ave., St. Louis 15
Procter & Gamble Dist. Co., Cincinnati
Puro Co., 2801 Locust St., St. Louis, Mo.
S. & S. Soap Co., 815 E. 135th St., N. Y. 54
Sanders Chem. Co., 2205 N. American St., Phila. 33
Southern Chemical Prods. Co., 170 Poplar St., Macon, Ga.
Stanalchem Inc., 350 Madison Ave., N. Y. 17
John T. Stanley Co., 642 W. 30 St., N. Y.
Swift & Co., Chicago
Tex-ite Prods. Corp., 859 E. 43 St., Brooklyn 10
Treplow Chem. Co., 100 New St., Paterson, N. J.
Union Carbide Chems. Co., 270 Park Ave., N. Y.
James Varley & Sons, 1200 Switzer Ave., St. Louis
Witco Chem. Co., 122 E. 42 St., N. Y. 17

DETERGENTS, SYNTHETIC (Finished), liquid, sudsing

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Antara Chemicals, 435 Hudson St., N. Y.
Armour & Co., 1355 W. 31st St., Chicago 9
Atlantic Refining Co., 260 Broad St., Phila.
Averil, Inc., 6780 NW 37 Ct., Miami, Fla.
B & W Chem. Co., 25920 Belle Porte Ave., Harbor City, Calif.
Baird & McGuire, Inc., Holbrook, Mass.
Betco Corp., 830 Elysian Ave., Toledo 7, O.
Bixon Chem. Corp., 1163 Southern Blvd., N. Y. 59
Britex Corp., 17 Lewis Wharf, Boston
Chicago Sanitary Prods. Co., 3100 S. Throop St., Chicago 8
Chemical Concentrates, Ft. Washington, Pa.
Chem. Service of Balto., Howard & West Sts., Balto.
Clarkson Laboratories, 1450 Ferry Ave., Camden, N. J.
Colgate-Palmolive Co., 300 Park Ave., N. Y. 22
Continental Chem. Co., 195 21 Ave., Paterson, N. J.
Continental Oil Co., 1270 Ave. of Americas, N. Y. 20
Dehydag Deutsche Hydrierwerke, Dusseldorf, Germany
Dura Wax Co., McHenry, Ill.
East Coast Soap Corp., 89 Coffey St., Bklyn. 31
Emkay Chem. Co., 319 2nd St., Elizabeth, N. J.
Essential Chems. Co., 5906 N. Port Washington Rd., Milkaukee
Federal Varnish Div., 2841 S. Ashland Ave., Chicago
Finetex, Inc., 418 Falmouth Ave., East Paterson, N. J.
Freesmeier Laboratories, 3661 Windsor Pl., St. Louis 13
Frontier Chem. Prods., 119 E. Soper St., St. Louis
Fuld Bros., Inc., 702 S. Wolfe St., Baltimore
Haag Laboratories, Inc., 14000 S. Seeley Ave., Blue Island, Ill.
Help, Inc., 122 W. Kinzie St., Chicago
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Hysan Prods. Co., 930 W. 38th Place, Chicago
Industrial Materials Co., 1017 McCall St., Houston
Kamen Soap Prods. Co., 5-22 50 Ave., L. I. C. 1, N. Y.
Klenzade Prods., Beloit, Wisc.
Klix Chem. Co., 551 Railroad Ave., S. San Francisco
Krystall Chem. Co., 1301 W. Belden Ave., Chicago
Lever Brothers Co., 390 Park Ave., N. Y. 22
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M. Michel & Co., 90 Broad St., N. Y. 4
Mona Industries, Inc., 65 E. 23rd St., Paterson, N. J.
Moss Soap Co., Pinellas Int'l. Airport, St. Petersburg, Fla.
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National Sanitary Products Co., 3944 Olive St., St. Louis
New South Mfg. Co., 711 Bankhead Ave. NW, Atlanta, 18
Old Empire, Inc., 865 Mt. Prospect Ave., Newark, N. J.
Onyx Chemical Corp., Warren & Morris Sts., Jersey City 2, N. J.
Ottawa Chem. Co., 823 Hamilton St., Toledo 7, O.
G. H. Packwood Mfg. Co., 1545 Tower Grove Ave., St. Louis
Peck's Prods. Co., 610 E. Clarence Ave., St. Louis 15
Petrochemicals Co., 420 Lexington Ave., N. Y. 17
Pilot Chem. Co., 11756 Burke St., Santa Fe Springs, Calif.
Procter & Gamble Dist. Co., Cincinnati
Purex Corp., 9300 Rayo Ave., South Gate, Calif.
Puro Co., 2801 Locust St., St. Louis, Mo.
Refined Prods., Inc., 624 Schuyler St., Lyndhurst, N. J.
Reily Chemical Co., P. O. Box 98, New Orleans
S. & S. Soap Co., 815 E. 135th St., N. Y. 54
Southern Chemical Prods. Co., 170 Poplar St., Macon, Ga.
John T. Stanley, Inc., 642 W. 30th St., N. Y. 1
Stepan Chem. Co., 427 W. Randolph St., Chicago
Surety Laboratories, 3946 Olive St., St. Louis 8
Surfact-Co., Inc., Box 114, Blue Island, Ill.
Swift & Co., Chicago
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Ultra Chem. Wks., 2 Wood St., Paterson, N. J.
James Varley & Sons, 1200 Switzer Ave., St. Louis
Witco Chem. Co., 122 E. 42nd St., N. Y. 17

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Ardmore Chem. Co., 840 Valley Brook Ave., Lyndhurst, N. J.
Armour Ind. Chem. Co., 110 N. Wacker Dr., Chicago
Ciba Co., Fair Lawn, N. J.
Clintwood Chem. Co., 33 N. LaSalle St., Chicago 2
Continental Chem. Co., 195 21 Ave., Paterson, N. J.
Dehydag Deutsche Hydrierwerke, Dusseldorf, Germany
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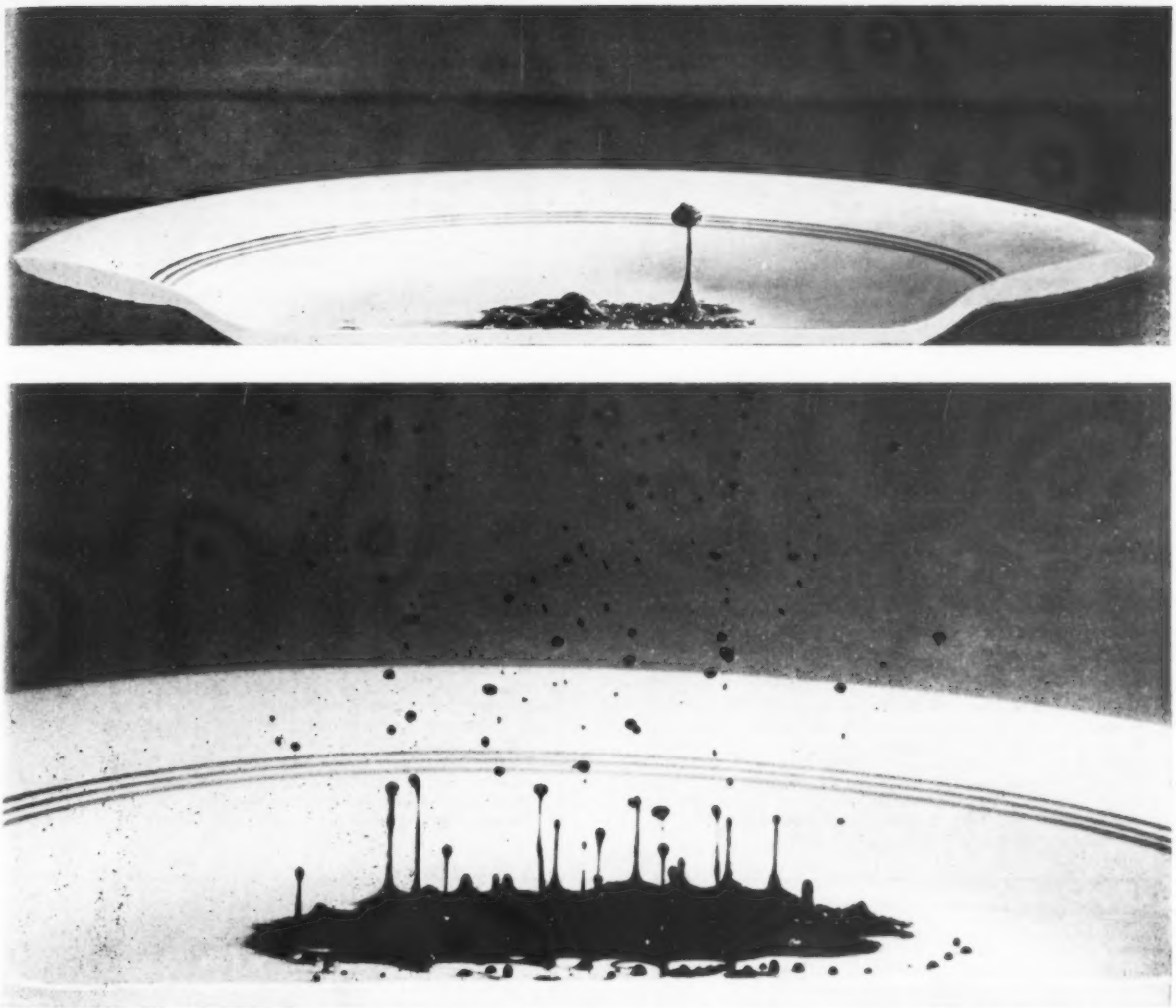

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Kearny Mfg. Co., Kearny, N. J.
Knapp Prods., Inc., Lodi, N. J.
Krystall Chem. Co., 1301 W. Belden Ave., Chicago 14
Marchon Prods., Ltd., Whitehaven, Cumberland, Eng.
M. Michel & Co., 90 Broad St., N. Y. 4
Miranol Chemical Co., 277 Coit St., Irvington, N. J.
Mona Industries, Inc., 65 E. 23rd St., Paterson, N. J.
Nalco Chem. Co., 6216 W. 66 Pl.. Chicago
Nopco Chem. Co., 60 Park Pl., Newark, N. J.
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Process Chems. Co., 8733 S. Dice Rd., Santa Fe Springs, Calif.
Quaker Chem. Prods. Corp., Conshohocken, Pa.
Rozilda Laboratories, 44-18 Purvis St., L. I. C., N. Y.
Sole Chem. Corp., 7740 S. Chicago Ave., Chicago 19
Stepan Chem. Co., 427 W. Randolph St., Chicago
Surfact-Co., Box 114, Blue Island, Ill.
Swift & Co., Chicago 9
Tanatex Chem. Co., Belleville Turnpike, Kearny, N. J.
Textilana Corp., 12607 Cerise Ave., Hawthorne, Calif.
Treplow Chemical Co., 100 New St., Paterson, N. J.
Ultra Chem. Wks., 2 Wood St., Paterson, N. J.
Van Dyk & Co., Belleville 9, N. J.
Witco Chem. Co., 122 E. 42nd St., N. Y. C.

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Clintwood Chem. Co., 33 N. LaSalle St., Chicago 2
E. I. du Pont de Nemours & Co., Wilmington
Emkay Chem. Co., 319 2nd St., Elizabeth, N. J.
Finetex, Inc., 418 Falmouth Ave., East Paterson, N. J.
Geigy Industrial Chemicals, Ardsley, N. Y.
Hodag Chem. Co., 7247 N. Central Park Ave., Chicago
Intex Chem. Corp., 167 Main St., Lodi, N. J.
Krystall Chem. Co., 1301 W. Belden Ave., Chicago 14
Marchon Products, Ltd., Whitehaven, Cumberland, Eng.
M. Michel & Co., 90 Broad St., N. Y. 4
Nopco Chem. Co., 60 Park Pl., Newark 1, N. J.
Onyx Chemical Corp., Warren & Morris Sts., Jersey City 2, N. J.
Pilot Chem. Co., 11756 Burke St., Santa Fe Springs, Calif.
Process Chems. Co., 8733 S. Dice Rd., Santa Fe Springs, Calif.
Quaker Chem. Prods. Corp., Conshohocken, Pa.
Refined Prods. Co., 624 Schuyler Ave., Lyndhurst, N. J.
Rozilda Laboratories, 44-18 Purvis St., L. I. C., N. Y.
Stanalchem Inc., 350 Madison Ave., N. Y. 17
Stepan Chem. Co., 427 W. Randolph St., Chicago
Swift & Co., Chicago
Tanatex Chem. Co., Belleville Turnpike, Kearny, N. J.
Textilana Corp., 12607 Cerise Ave., Hawthorne, Calif.
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Atlas Powder Co., Wilmington 99, Dela.
Blockson Chemicals, Joliet, Ill.
Ciba Co., Fair Lawn, N. J.
E. F. Drew & Co., 15 E. 26 St., N. Y. 10
Dehydag Deutsche Hydrierwerke, Dusseldorf, Germany
Emkay Chem. Co., 319 2nd St., Elizabeth, N. J.
E. I. du Pont de Nemours & Co., Wilmington
Intex Chem. Corp., 167 Main St., Lodi, N. J.
Jefferson Chem. Co., 1121 Walker Ave., Houston, Tex.
Marchon Prods., Ltd., Whitehaven, Cambridge, Eng.
M. Michel & Co., 90 Broad St., N. Y. 4
Nopco Chem. Co., 60 Park Pl., Newark, N. J.
Olin Mathieson Chem. Corp., Org. Chems., 745 5th Ave., N. Y. 22
Onyx Chemical Corp., Warren & Morris Sts., Jersey City 2, N. J.
Pennsalt Chems. Corp., 3 Penn Center, Phila.
Process Chems. Co., 8733 S. Dice Rd., Santa Fe Springs, Calif.
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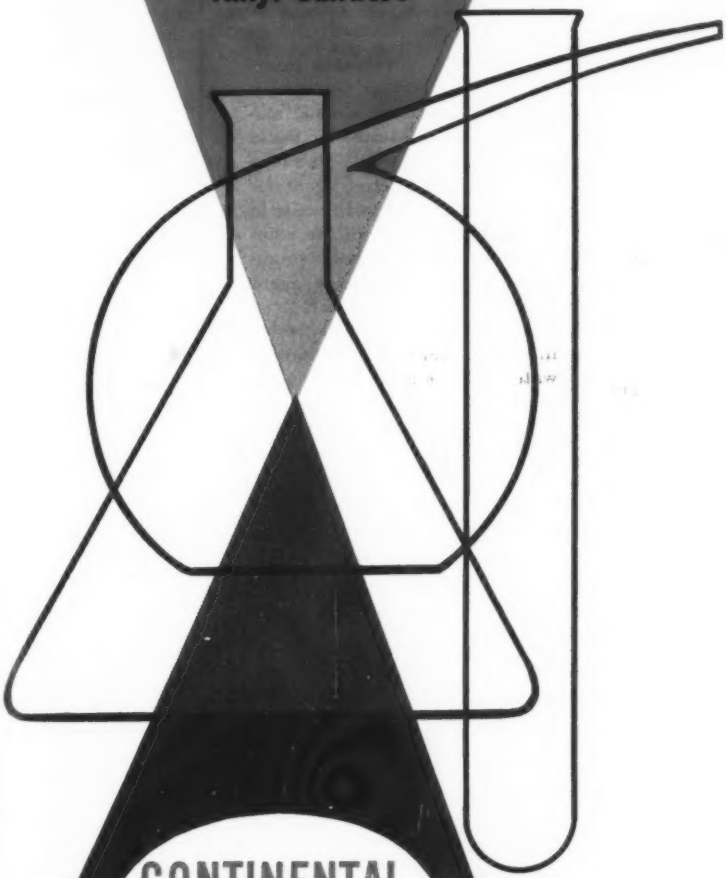

CONTINENTAL CHEMICAL CO.

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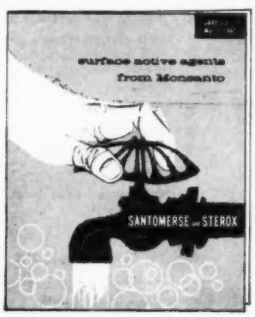

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Emkay Chem. Co., 319 2nd St., Elizabeth, N. J.
Hodag Chem. Corp., 7247 N. Central Park, Chicago
Intex Chem. Corp., 167 Main St., Lodi, N. J.
Jefferson Chemical Co., 1121 Walker St., Houston, Tex.
Monsanto Chem. Co., St. Louis
Nalco Chem. Co., 6216 W. 66 Pl., Chicago
Nopco Chem. Co., 60 Park Pl., Newark 1, N. J.
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Onyx Chemical Corp., Warren & Morris Sts., Jersey City 2, N. J.
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Process Chems. Co., 8733 S. Dice Rd., Santa Fe Springs, Calif.
Quaker Chem. Prods. Corp., Conshohocken, Pa.
Rohm & Haas Co., 222 W. Washington Square, Phila. 5
Rozilda Laboratories, 44-18 Purvis St., I. I. C., N. Y.
Sole Chem. Corp., 7740 S. Chicago Ave., Chicago 19
Stanalchem Inc., 350 Madison Ave., N. Y. 17
Stepan Chemical Co., 427 W. Randolph St., Chicago
Textilana Corp., 12607 Cerise Ave., Hawthorne, Calif.
Union Carbide Chems. Co., 270 Park Ave., N. Y.

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American Cholesterol Prods., Talmadge Rd., Edison, N. J.
Armour Ind. Chem. Co., 110 N. Wacker Dr., Chicago
Blockson Chemicals, Joliet, Ill.
Ciba Co., Fair Lawn, N. J.
Continental Chem. Co., 195 21 Ave., Paterson, N. J.
E. F. Drew & Co., 15 E. 26 St., N. Y. 10
E. I. du Pont de Nemours & Co., Wilmington
Emkay Chem. Co., 319 2nd St., Elizabeth, N. J.
Finetex, Inc., 418 Malmouth Ave., East Paterson, N. J.
Hodag Chem. Corp., 7247 N. Central Park, Chicago
General Mills, Kankakee, Ill.
Hercules Powder Co., Wilmington, Del.
Hodag Chem. Corp., 7247 N. Central Park Ave., Chicago 45
Intex Chem. Corp., 167 Main St., Lodi, N. J.
Jefferson Chem. Co., 1121 Walker St., Houston, Tex.
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Mona Industries, Inc., 65 E. 23rd St., Paterson, N. J.
Monsanto Chem. Co., St. Louis, Mo.
Nalco Chem. Co., 6216 W. 66 Pl., Chicago
Nopco Chem. Co., 60 Park Pl., Newark 1, N. J.
Olin Mathieson Chem. Corp., Org. Chems., 745 5th Ave., N. Y. 22
Onyx Chemical Corp., Warren & Morris Sts., Jersey City 2, N. J.
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Sandoz, Inc., 61 Van Dam St., N. Y. 13
Pennsalt Chemicals Corp., 3 Penn Center Plaza, Phila. 2
Quaker Chem. Prods. Corp., Conshohocken, Pa.
Sole Chem. Corp., 7740 S. Chicago Ave., Chicago 19
Stepan Chem. Co., 427 W. Randolph St., Chicago
Surfact-Co., Inc., Box 114, Blue Island, Ill.
Swift & Co., Chicago
Tanatex Chem. Corp., Belleville Turnpike, Kearny, N. J.
Textilana Corp., 12607 Cerise Ave., Hawthorne, Calif.
Treplow Chemical Co., 100 New St., Paterson, N. J.
Van Dyk & Co., Belleville 9, N. J.
Victor Chem. Wks., 155 N. Wacker Dr., Chicago 5
Witco Chem. Co., 122 E. 42 St., N. Y.
Wyandotte Chemicals Corp., Mich. Alkali Div., Wyandotte, Mich.

DIATOMACEOUS EARTH

Charles B. Chrystal Co., 53 Park Pl., N. Y. 7
Dicalite Div., 612 S. Flower St., Los Angeles
E. I. du Pont de Nemours & Co., Wilmington
Eagle-Picher Co., Cincinnati, O.
Johns-Manville Prods. Corp., 22 E. 40th St., N. Y. 16
Tamms Industries, 228 N. LaSalle St., Chicago
Whittaker Clark & Daniels, 100 Church St., N. Y.

DIAZINON

Geigy Agricultural Chemicals, Ardsley, N. Y.

DICHLOROBENZENE (see Paradichlorobenzene)

DIELDRIN

Shell Chemical Corp., 110 W. 51 St., N. Y.

DIELDRIN FORMULATIONS

ABC Compounding Co., Oakcliff & Harwell Rds., Atlanta, Ga.
Agricultural Chemicals, Inc., Greenville, Miss.
Amer. Potash & Chem. Corp., 3030 W. 6th St., Los Angeles
Atlas Chem. Corp., Waynesboro, Ga.
Baird & McGuire, Inc., Holbrook, Mass.
California Spray-Chemical Corp., Richmond, Calif.
Carolina Chemicals, Inc., West Columbia, S. C.
Chapman Chemical Co., 707 Dermon Bldg., Memphis, Tenn.
Chemical Compounding Corp., 262 Huron St., Bklyn.
Chemical Insecticide Corp., 30 Whitman Ave., Metuchen, N. J.
Chipman Chemical Co., Bound Brook, N. J.
Coahoma Chemicals, Inc., Beacon, N. Y.
Dettelbach Chem. Corp., 4111 Peachtree Rd., Atlanta 19
Douglas Chem. Co., 620 E. 16th Ave., North Kan. City, Mo.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Flag Sulphur & Chem. Co., Tampa, Fla.
Florida Agricultural Supply Co., P. O. 658, Jacksonville, Fla.
Food Machy. & Chem. Corp., 161 E. 42 St., N. Y. 17
Frontier Chem. Prods., 119 E. Soper St., St. Louis
Hub States Chems. & Equipment, 1255 N. Windsor St., Indianapolis
McLaughlin, Gormley King Co., 1715 5th St., Minneapolis, Minn.
Naco Fertilizer Co., Charleston, S. C.
S. P. Penick & Co., 100 Church St., N. Y. 8
Pennsalt Chems. Corp., 3 Penn Center, Phila.
Pittsburgh Coke & Chem. Co., Grant Bldg., Pittsburgh
Plainsman Supply Co., Plainview, Tex.
Prentiss Drug & Chem. Co., 101 W. 31st St., N. Y.
Private Brands, Inc., 300 S. 3rd St., Kansas City, Kan.
Reasor-Hill Corp., Jacksonville, Ark.
Residex Corp., Clark, N. J.
Stauffer Chem. Co., 380 Madison Ave., N. Y.
Tex-ite Prods. Corp., 859 E. 43 St., Brooklyn
Triangle Chemical Co., Macon, Ga.
Tyner Petrus Co., W. Monroe, La.
United-Heckathorn, 600 S. 4th St., Richmond, Calif.
James Varley & Sons, 1200 Switzer Ave., St. Louis 15
Virginia-Carolina Chemical Corp., Richmond, Va.
Woolfolk Chem. Wks., Fort Valley, Ga.
York Chem. Co., 23 Dean St., Bklyn. 1

DIES (see Soap Dies)

DIETHANOLAMINE (see listings under Ethanolamines)

DIETHYLENE GLYCOL (see under Ethylene Glycols)

DIETHYLTOLUAMIDE (Insect Repellent)

Cowles Chemical Co., 7016 Euclid Ave., Cleveland
Hercules Powder Co., Wilmington, Del.
R. W. Greeff & Co., 10 Rockefeller Plaza, N. Y.
McLaughlin Gormley King Co., 1715 5th St., Minneapolis

DIFFUSERS (Steam and Air)

Dula Manufacturing Co., 351 Atlantic Ave., Brooklyn
Gallo Fumeral Co., 1312 Forest St., Racine, Wisc.
Hydro-Mist Div., 1515 W. Glenoaks Blvd., Glendale, Calif.

DILUENTS, INSECTICIDES (see Clays; also Abrasives and Fillers)

DINONYL PHENOL

Antara Chemicals Div., 435 Hudson St., N. Y. 14
Jefferson Chem. Co., 1121 Walker Ave., Houston, Texas
Stepan Chem. Co., 427 W. Randolph St., Chicago

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DIP TUBES, AEROSOL (see Aerosol Dip Tubes)

DIPHENYL OXIDE (see Aromatic Chemicals)

DIPROPYLENE GLYCOL

Celanese Corp. of America, 180 Madison Ave., N. Y.
Dow Chemical Co., Midland, Mich.
Jefferson Chemical Co., 1121 Walker Ave., Houston, Tex.
Olin Mathieson Chem. Corp., Org. Chems., 745 5th Ave., N. Y.
Union Carbide Chems. Co., 270 Park Ave., N. Y.

DISH WASHING COMPOUND DISPENSERS (see Soap Dispensers, Dishwashing Compound)

DISHWASHING COMPOUNDS

ABC Compounding Co., Oakcliff & Harwell Rds., Atlanta, Ga.
Almo Laboratories Co., 424 Madison Ave., N. Y. 17
Amka Chemical Co., 2229 N. 29th Ave., Phoenix, Ariz.
Armour & Co., 1355 W. 31st St., Chicago
Arrow Chemical Products, Inc., 1067 St. Anne St., Detroit
B & W Chem. Co., 25920 Belle Porte Ave., Harbor City, Calif.
B. T. Babbitt, Inc., 625 Madison Avenue, New York
Baird & McGuire, Inc., Holbrook, Mass.
Bixon Chemical Corp., 1163 Southern Blvd., New York
Barton Chemical Co., 1230 W. 46th St., Chicago 9
Britex Corp., 17 Lewis Wharf, Boston 10
Buckingham Wax Corp., 51-03 Van Dam, Long Island City, N. Y.
Capitol Soap Corp., 310 Colfax Ave., Clifton, N. J.
Chemical Service of Baltimore, Howard & West Sts., Baltimore, Md.
Chemical Supply Co., 3540 Norton Rd., Cleveland 11
Chicago Sanitary Products Co., 3100 S. Throop St., Chicago
Clarkson Laboratories, 1450 Ferry Ave., Camden, N. J.
Colgate-Palmolive Co., 300 Park Ave., New York
Continental Chem. Co., 195 21 Ave., Paterson, N. J.
Davies-Young Soap Co., 705 Albany St., Dayton, O.
Dettelbach Chem. Corp., 4111 Peachtree Rd., Atlanta 19
E. F. Drew & Co., 15 E. 26 St., N. Y. 10
Dura Wax Co., Box 218, McHenry, Ill.
East Coast Soap Corp., 89 Coffey St., Brooklyn, N. Y.
Essential Chemical Co., 5906 N. Port Washington Rd., Milwaukee
Fitzpatrick Bros., 1300 W. 32nd Pl., Chicago 8
Frontier Chemical Prods., Inc., 119 E. Soper St., St. Louis
Fuld Bros., 702 S. Wolfe St., Baltimore
James Good Co., 2107 E. Susquehanna Ave., Philadelphia
Haag Labs, 14000 S. Seeley Ave., Blue Island, Ill.
Harley Soap Co., Pearce & Orthodox St., Philadelphia
Help, Inc., 122 W. Kinzie St., Chicago
R. M. Hollingshead Corp., 840 Cooper St., Camden, N. J.
Hysan Prods. Co., 930 W. 38th Place, Chicago
Independence Chem. Co., N. Railroad & Essex Sts., Gloucester City, N.J.
International Chemical Co., 3140 S. Canal St., Chicago
"J" Chemical Works, 602 W. 37th St., New York 18
Klenzade Products, Inc., Box 1020, Beloit, Wis.
Klix Chemical Co., 551 Railroad Ave., S. San Francisco
Lincoln Research, Inc., 3250 Monroe St., Toledo, O.
Liquisan, Inc., 2816 Addison St., Chicago
Lu Bar Co., 1708 Campbell St., Kansas City, Mo.
National Chemical Labs, 825 Lombard St., Philadelphia
National Milling & Chemical Co., 4601 Flat Rock Rd., Phila. 27
New Jersey Chemical Co., 56 Park Ave., Lyndhurst, N. J.
Oil Kraft, Inc., 3330 Beckman St., Cincinnati 23
Pilot Chem. Co., 11756 Burke St., Santa Fe Springs, Calif.
G. H. Packwood Mfg. Co., 1545 Tower Grove Ave., St. Louis
Purex Corp., 9300 Rayo Ave., Southgate, Calif.
Peck's Products Co., 610 E. Clarence Ave., St. Louis
Peerless Chemical Co., 1300 N. Fulton Ave., Baltimore
Pennsalt Chems. Corp., 3 Penn Center, Phila.
Pioneer Mfg. Co., 3053 E. 87th St., Cleveland
Procter & Gamble Distributing Co., Cincinnati, O.
Purex Corp., Industrial Div., P. O. Box 9686, Phila. 3
Puro Co., 2801 Locust St., St. Louis
W. T. Rawleigh Co., Freeport, Ill.
Reily Chemical Co., Box 98, New Orleans, La.
S. & S. Soap Co., 815 E. 135th St., N. Y. 54
Southern Chemical Prod. Co., 170 Poplar St., Macon, Ga.
John T. Stanley Co., 642 W. 30th St., New York
George Stearns Chemical Corp., Madison, Wis.
Swift & Co., Chicago
Tex-ite Prods. Corp., 859 E. 43rd St., Brooklyn 10
Thompson-Hayward Chemical Co., 2915 SW Blvd., Kansas City, Mo.
Time Chemical, Inc., 4350 S. Wolcott Ave., Chicago 9
Trep'ow Chem. Co., 100 New St., Paterson, N. J.
Trio Chemical Works, 341 Scholes St., Brooklyn, N. Y.
Ultra Chemical Works, 2 Wood St., Paterson, N. J.
Uncle Sam Chemical Co., 577 W. 131st St., N. Y.

James Varley & Sons, 1200 Switzer Ave., St. Louis
Virginia-Carolina Chemical Corp., Richmond, Va.
Roy Wilson Mfg. Co., 2541 Archer Ave., Chicago
Wyandotte Chemicals Corp., J. B. Ford Div., Wyandotte, Mich.

DISHWASHING RINSE INJECTORS (see Rinse Injectors)

DISINFECTANTS, CHLORINATED

Antara Chemicals Div., 435 Hudson St., N. Y. 14
B & W Chem. Co., 25920 Belle Porte Ave., Harbor City, Calif.
Baird & McGuire, Inc., Holbrook, Mass.
Barton Chemical Co., 1230 W. 46th St., Chicago 9
Blockson Chemicals, Joliet, Ill.
Buckingham Wax Co., 51-03 Van Dam St., Long Island City, N. Y.
Chem. Service of Baltimore, Howard & West Sts., Baltimore
Chicago Sanitary Prods. Co., 3100 S. Throop St., Chicago
Dow Chemical Co., Midland, Mich.
E. I. du Pont de Nemours Co., Wilmington, Del.
Fuld Bros., 702 S. Wolfe St., Baltimore
Haag Laboratories, 14000 S. Seeley Ave., Blue Island, Ill.
Harley Soap Co., Pierce & Orthodox Ave., Phila., 37
Heyden Chem. Div., Heyden Newport Chem. Corp., 342 Madison Ave., N. Y.
Higley Chemical Co., Dubuque, Iowa
R. M. Hollingshead Corp., Camden, N. J.
Hysan Products Co., 930 W. 37th Place, Chicago
Industrial Materials Co., 1017 McCall St., Houston
Klix Chem. Co., 551 Railroad Ave., S. San Francisco
Midland Labs., Dubuque, Iowa
Monsanto Chemical Co., St. Louis, Mo.
National Chemical Laboratories, 825 Lombard St., Phila.
National Milling & Chem. Co., 4601 Flat Rock Rd., Phila. 27
New Jersey Chem. Co., 56 Park Ave., Lyndhurst, N. J.
North Coast Soap & Chem. Works, Seattle, Wash.
Oil Kraft, Inc., 3330 Beekman St., Cincinnati
Old Empire, Inc., Mt. Prospect & Verona Ave., Newark, N. J.
Olin Mathieson Chem. Corp., Ind. Chems., Baltimore 3
Ottawa Chemical Co., 823 Hamilton St., Toledo, O.
Peck's Products Co., 610 E. Clarence Ave., St. Louis 15
Pennsalt Chems. Corp., 3 Penn Center Plaza, Phila.
Puro Co., 2801 Locust St., St. Louis, Mo.
Reily Chemical Co., Box 98, New Orleans, La.
G. S. Robins & Co., 126 Chouteau Ave., St. Louis 2
Sonneborn Chem. & Ref. Corp., 300 Park Ave. S., N. Y.
Southern Chemical Prods. Co., 170 Poplar St., Macon, Ga.
Stauffer Chem. Co., 380 Madison Ave., N. Y.
Stecker Chems. Inc., 45 N. Broad St., Ridgewood, N. J.
Tex-ite Prods. Corp., 859 E. 43rd St., Brooklyn 10
Thompson-Hayward Chem. Co., 2915 S.W. Blvd., Kansas City, Mo.
Trio Chem. Works, 341 Scholes St., Brooklyn
U. S. Sanitary Specialties Corp., 1001 S. California Ave., Chicago 12
Victor Chem. Works, 155 N. Wacker Dr., Chicago
James Varley & Sons, 1200 Switzer Ave., St. Louis
Wyandotte Chemicals Corp., J. B. Ford Div., Wyandotte, Mich.

DISINFECTANTS, COAL TAR and PINE OIL

ABC Compounding Co., Oakcliff & Harwell Rds., S.W., Atlanta, Ga.
American British Chem. Supplies, 180 Madison Ave., N. Y.
A-M-R Chem. Co., 985 E. 35th St., Brooklyn 10
B & W Chem. Co., 25920 Belle Porte Ave., Harbor City, Calif.
Baird & McGuire, Inc., Holbrook, Mass.
Barnett Chem. Prods. Co., 326 Lafayette Bldg., Phila. 6
Bixon Chem. Corp., 1163 Southern Blvd., N. Y. 59
Buckingham Wax Co., Van Dam St. & Borden Ave., L. I. City, N. Y.
Capitol Soap Corp., 310 Colfax Ave., Clifton, N. J.
Chemical Concentrates, Ft. Washington, Pa.
Chemical Compounding Corp., 262 Huron St., Bklyn.
Chemical Service of Balto., Howard & West Sts., Balto.
Chicago Sanitary Prods. Co., 3100 S. Throop St., Chicago
Clarkson Laboratories, 1450 Ferry Ave., Camden, N. J.
Concord Chem. Co., 205 S. 2nd St., Camden, N. J.
Wm. Cooper & Nephews, 1909 Clifton Ave., Chicago
Davies-Young Soap Co., Dayton, O.
Dettelbach Chem. Corp., 4111 Peachtree Rd., Atlanta 19
East Coast Soap Corp., 89 Coffey St., Brooklyn 31
Emeryville Chem. Co., 405 Montgomery St., San Francisco
Emulso Corp., 301 Ellicott St., Buffalo
Fine Organics, Inc., 205 Main St., Lodi, N. J.
Freesmeier Laboratories, 3661 Windsor Pl., St. Louis 13
Fuld Bros., 702 S. Wolfe St., Baltimore
Gaylord Chem. Co., 701 Woodsweather Rd., Kansas City
James Good, Inc., 2107 Susquehanna Ave., Phila
Haag Laboratories, Inc., 14000 S. Seeley Ave., Blue Island, Ill.
Harley Soap Co., Pearce & Orthodox Sts., Phila. 37
Higley Chem. Co., Dubuque, Iowa
R. M. Hollingshead Corp., Camden, N. J.
James Huggins & Son, 239 Medford St., Malden, Mass.
Hysan Products Co., 900 W. 38th Place, Chicago
Industrial Materials Co., 1017 McCall St., Houston
Kemiko Mfg. Co., 500 Chancellor Ave., Irvington, N. J.
Klix Chem. Co., 551 Railroad Ave., South San Francisco, Calif.
McLaughlin, Gormley, King Co., 1715 5th St., S.E., Minneapolis
Midland Labs., Dubuque, Iowa
National Chemical Laboratories, 825 Lombard St., Phila.
New Jersey Chemical Co., 56 Park Ave., Lyndhurst, N. J.
N. Y. Soap Co., 258 Third St., Brooklyn
Old Empire, Inc., Mt. Prospect & Verona Ave., Newark, N. J.
Pace, Inc., MacArthur Rd., Wilmington, Del.
Peck's Prods. Co., 610 E. Clarence Ave., St. Louis
Perrow Chemical Co., Hurt, Va.
Puro Co., 2901 Locust St., St. Louis, Mo.
J. W. Quinn Drug Co., Greenwood, Miss.
Reily Chemical Co., Industrial Prods. Div., P. O. Box 98, New Orleans
Riverside Chem. Co., N. Tonawanda, N. Y.
Sanders Chem. Co., 2205 N. American St., Phila. 33
I. Schneid, Inc., 765 Trabert Ave., N. W., Atlanta, Ga.
Sonneborn Chem. & Refining Corp., 300 4th Ave., N. Y.
Southern Chemical Prods. Co., 170 Poplar St., Macon, Ga.
John T. Stanley Co., 642 W. 30th St., N. Y.
Surety Laboratories, 3946 Olive St., St. Louis 8
Tex-ite Prods. Corp., 859 E. 43rd St., Brooklyn 10
Thompson-Hayward Chem. Co., 2915 S.W. Blvd., Kansas City, Mo.
Trio Chem. Works, 341 Scholes St., Brooklyn
Sprayway, Inc., 7640 Vincennes Ave., Chicago 20
Uncle Sam Chem. Co., 577 W. 131st St., N. Y.
U. S. Sanitary Spec. Corp., 1001 S. California Ave., Chicago 12
Ultra Chem. Works, 2 Wood St., Paterson, N. J.
James Varley & Sons, 1200 Switzer Ave., St. Louis
T. F. Washburn Co., 2244 Elston Ave., Chicago

DISINFECTANTS, IODINE

B & W Chem. Co., 25920 Belle Porte Ave., Harbor City, Calif.
Baird & McGuire, Inc., Holbrook, Mass.
Britex Corp., 17 Lewis Wharf, Boston.
Chemical Service of Baltimore, Howard & West Sts., Baltimore, Md.
Chicago Sanitary Prods. Co., 3100 S. Throop St., Chicago
Clarkson Laboratories, 1450 Ferry Ave., Camden, N. J.
Concord Chem. Co., 205 S. 2nd St., Camden, N. J.
Davies-Young Soap Co., Dayton, O.
Fine Organics, Inc., 211 E. 19th St., N. Y. 3
Franklin Research, 5134 Lancaster Ave., Phila. 31
Fuld Bros., 702 S. Wolfe St., Baltimore, Md.
Hysan Products Co., 900 W. 38th Pl., Chicago
Klix Chemical Co., 551 Railroad Ave., S. San Francisco
Peck's Prods. Co., 610 E. Clarence Ave., St. Louis
S. B. Pennick & Co., NYQ Chem. Div., 100 Church St., N. Y.
Reily Chemical Co., Industrial Prods. Div., P.O. Box 98, New Orleans,
Southern Chemical Prods. Co., 170 Poplar St., Macon, Ga.
Textilana Corp., 12607 Cerise Ave., Hawthorne, Calif.
Tex-ite Prods. Corp., 859 E. 43rd St., Brooklyn 10
Trio Chem. Works, 2 Wood St., Paterson, N. J.
Uncle Sam Chem. Co., 577 W. 131st St., N. Y.
James Varley & Sons, 1200 Switzer Ave., St. Louis

DISINFECTANTS, QUATERNARY AMMONIUM (see also Quaternary Ammonium Compounds)

ABC Compounding Co., Oakcliff & Harwell Rds., Atlanta, Ga.
Aireactor Corp., 271 Madison Ave., N. Y. 16
Airkem, Inc., 241 E. 44th St., N. Y. 17
Antara Chemicals, 435 Hudson St., N. Y. 14
Armour Industrial Chem. Co., 110 N. Wacker Dr., Chicago
B & W Chem. Co., 25920 Belle Porte Ave., Harbor City, Calif.
Baird & McGuire, Inc., Holbrook, Mass.
Barlow Chem. Corp., Ossining, N. Y.
Barton Chemical Co., 1230 W. 46th St., Chicago 9
Bixon Chem. Corp., 1163 Southern Blvd., N. Y. 59
Britex Corp., 17 Lewis Wharf, Boston
Buckingham Wax Co., 51 Van Dam St., L. I. C., N. Y.
Chemical Concentrates, Ft. Washington, N. J.
Chem. Serv. of Balto., Howard & West Sts., Balto.
Chicago San. Prods. Co., 3100 S. Throop St., Chicago 8
Clarkson Laboratories, 1450 Ferry Ave., Camden, N. J.
Cowles Chemical Co., 7016 Euclid Ave., Cleveland 3
Davies-Young Soap Co., Dayton 1, O.
Dettelbach Chem. Corp., 4111 Peachtree Rd., Atlanta 19
Fine Organics, Inc., 205 Main St., Lodi, N. J.
Fleetwood Prods. Co., 509 5th Ave, N. Y. 17
Franklin Research, 5134 Lancaster Ave., Phila.
Frontier Chem. Prods., 119 E. Soper St., St. Louis 11

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DISINFECTANTS, QUATERNARY AMMONIUM (Cont'd.)

Fuld Bros., 702 S. Wolfe St., Baltimore
Geigy Industrial Chemicals, Ardsley, N. Y.
James Good, Inc., 2107 Susquehanna Ave., Phila. 25
R. M. Hollingshead Corp., Camden, N. J.
Hysan Products Co., 900 W. 38th Place, Chicago
Index Chem. Corp., 167 Main St., Lodi, N. J.
Klix Chem. Co., 551 Railroad Ave., South San Francisco, Calif.
M. Michel & Co., 90 Broad St., N. Y. 4
Midland Laboratories, Dubuque, Iowa
Nalco Chem. Co., 6216 W. 66 Pl., Chicago
National Chem. Labs., 825 Lombard St., Phila.
National Milling & Chem. Co., 4601 Flat Rock Rd., Phila. 27
Onyx Chemical Corp., Warren & Morris Sts., Jersey City 2, N. J.
Peck's Prods. Co., 610 E. Clarence Ave., St. Louis
Puro Co., 2801 Locust St., St. Louis 3
Refined Prods. Co., 624 Schuyler Ave., Lyndhurst, N. J.
Reily Chemical Co., Industrial Prods. Div., P.O. Box 98, New Orleans, La.
Rochester Sanitary Prods. Co., 846 Exchange St., Rochester, N. Y.
Rohm & Haas Co., 222 W. Washington Sq., Philadelphia
Sole Chem. Corp., 7740 S. Chicago Ave., Chicago 19
Southern Chemical Prods. Co., 170 Poplar St., Macon, Ga.
Stecker Chems., Inc., 45 N. Broad St., Ridgewood, N. J.
Sterwin Chemicals, Inc., 1450 Broadway, N. Y.
Surety Laboratories, 3946 Olive St., St. Louis 8
Tanatex Chem. Corp., Belleville Turnpike, Kearny, N. J.
Tex-ite Prods. Corp., 859 E. 43rd St., Brooklyn 10
Thompson-Hayward Chem. Co., 2915 SW Blvd., Kansas City 8
Trio Chemical Wks., 341 Scholes St., Bklyn. 6
Uncle Sam Chem. Co., 573 W. 131st St., N. Y.
U. S. Sanitary Specialties Corp., 1001 S. California Ave., Chicago 12
James Varley & Sons, 1200 Switzer Ave., St. Louis
Virginia-Carolina Chem. Corp., Richmond 8, Va.
Witco Chem. Co., 122 E. 42 St., N. Y. 17
Wyandotte Chemicals Corp., J. B. Ford Div., Wyandotte, Mich.

DISINFECTANTS (Other than foregoing, including basic chemical materials)

E. I. du Pont de Nemours & Co., Wilmington, Del.
Fleetwood Prods. Co., 509 5th Ave., N. Y.
Hilton-Davis Chemical Co., 2235 Langdon Farm Rd., Cincinnati
Monsanto Chemical Co., St. Louis, Mo.
Ottawa Chem. Co., 819 Hamilton St., Toledo, O.
Sindar Corp., 321 W. 44th St., N. Y.
Stecker Chemicals, Inc., 45 N. Broad St., Ridgewood, N. J.
R. T. Vanderbilt Co., 230 Park Ave., N. Y.

DISPENSERS, BOTTLE (see Sprayers, Atomizing)

DISPENSERS, SOAP (see Soap Dispensers)

DISPENSERS, WATERLESS HAND CLEANER (see Soap Dispensers)

DISPENSERS, FOR DISHWASHING MACHINES (see Soap Dispensers)

DISPERSING AGENTS (See Surface Active Agents)

DISPENSING PUMPS (see Pumps, Dispensing)

DOG REPELLENTS

California Spray-Chemical Corp., Richmond, Calif.
Davies-Young Soap Co., Dayton 1, O.
Fuld Bros., 702 S. Wolfe St., Baltimore
Hysan Products Co., 930 W. 38th Place, Chicago
Kaysing Corp., 8005 Alabama, St. Louis 11
Kemiko Mfg. Co., 500 Chancellor Ave., Irvington, N. J.
S. B. Penick & Co., 100 Church St., N. Y. 8
Tex-ite Prods. Corp., 859 E. 43rd St., Brooklyn 10
Trio Chem. Wks., 341 Scholes St., Bklyn.
U. S. Sanitary Specialties Corp., 1001 S. California Blvd., Chicago 12

DRAIN PIPE SOLVENTS

ABC Compounding Co., Oakcliff & Harwell Rds., Atlanta, Ga.
Chem. Service of Balto., Howard & West Sts., Balto.
Chicago Sanitary Prods. Co., 3100 S. Throop St., Chicago
Drackett Co., 5020 Spring Grove, Cincinnati 32
Frontier Chem. Prods., 119 E. Soper St., St. Louis
James Good, Inc., 2107 Susquehanna Ave., Phila.
Help, Inc., 122 W. Kinzie St., Chicago
Higley Chemical Co., Dubuque, Ia.
R. M. Hollingshead Corp., Camden, N. J.
Kemiko Mfg. Co., 500 Chancellor Ave., Irvington, N. J.
North Coast Chem. & Soap Wks., Seattle, Wash.
Pennsalt Chems. Corp., 3 Penn Center, Phila. 2
Tex-ite Prods. Corp., 859 E. 43 St., Bklyn. 10
Simoniz Co., 2100 Indiana Ave., Chicago 16
S. & S. Soap Co., 815 E. 135 St., N. Y. 54
U. S. Sanitary Specialties Corp., 1001 S. California Ave., Chicago 12

DRIP MACHINES

Hysan Products Co., 930 W. 37th Place, Chicago
Mollen Chem. Co., 1850 N. Uber St., Phila. 21
Puro Co., 2801 Locust St., St. Louis 3
Uncle Sam Chem. Co., 577 W. 131st St., N. Y.

DRUM PUMPS (see Pumps, Dispensing)

DRUMS, Fibre

Bennett Industries, 122 N. Washington St., Peotone, Ill.
Benton Fibre Drum Co., 186 Van Dyke St., Brooklyn 31
Carpenter Container Corp., 147 41st St., Brooklyn 32
Continental Can Co., 100 E. 42nd St., N. Y. 17
Emery-Carpenter Container Co., Carew Tower, Cincinnati
Federal Fibre Corp., 3704 10th St., L. I. C., N. Y.
Fibre Drum Co., 20 N. Wacker Dr., Chicago 6
Master Package Corp., Owen, Wisc.
Monmouth Container Corp, Matawan, N. J.
Plyfiber Container Corp., 650 South Ave., Garwood, N. J.
Rheem Mfg. Co., 1701 Edgar Rd., W., Linden, N. J.
Seymour & Peck Co., Blue Island, Ill.
Virginia Barrel Co., P. O. Box 86, Staten Island, N. Y.

DRUMS, Metal

Bennett Industries, 122 N. Washington St., Peotone, Ill.
Continental Can Co., 100 E. 42 St., N. Y. 17
Geuder, Paeschke & Frey Co., 324 N. 15 St., Milwaukee
Inland Steel Container Co., 6532 S. Menard Ave., Chicago
Jones & Laughlin Steel Corp., 3 Gateway Center, Pittsburgh
Myers Drum Co., 6549 San Pablo Ave., Oakland, Calif.
National Steel Container Corp., Chicago 38
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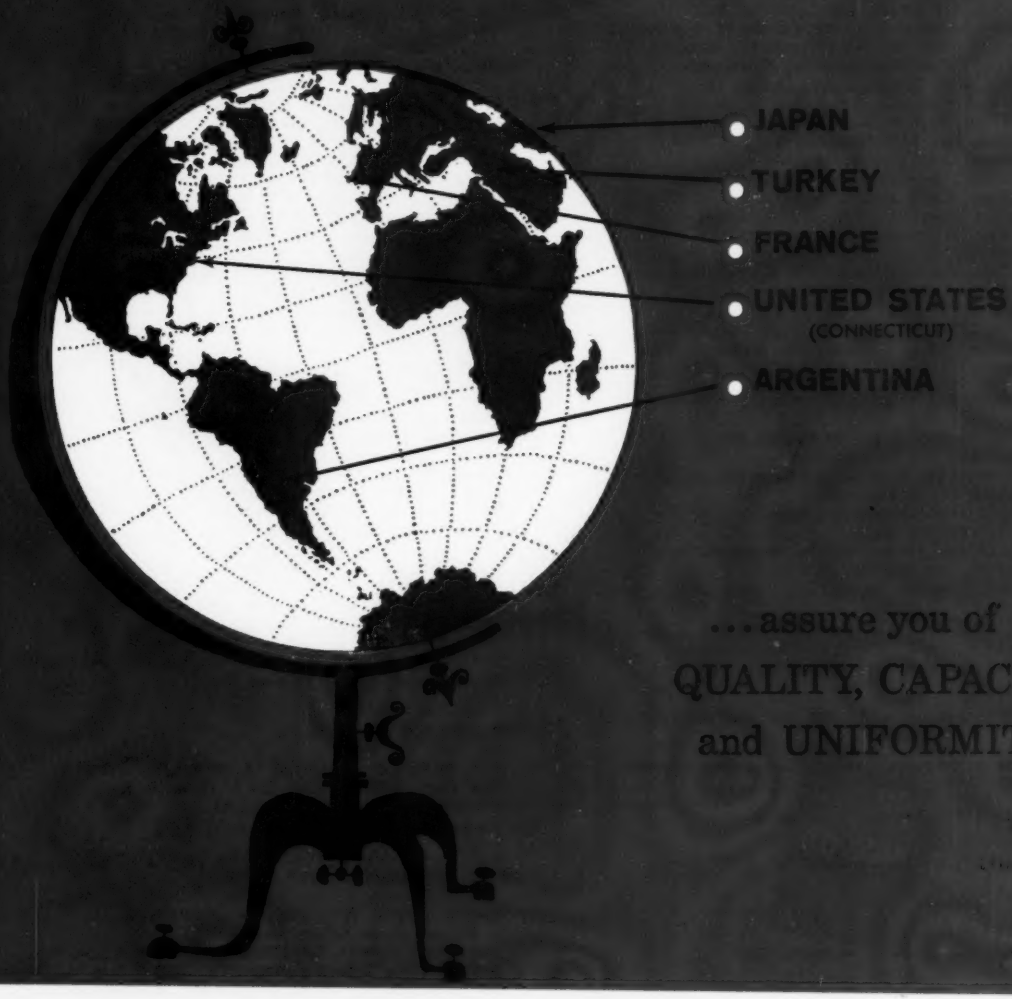

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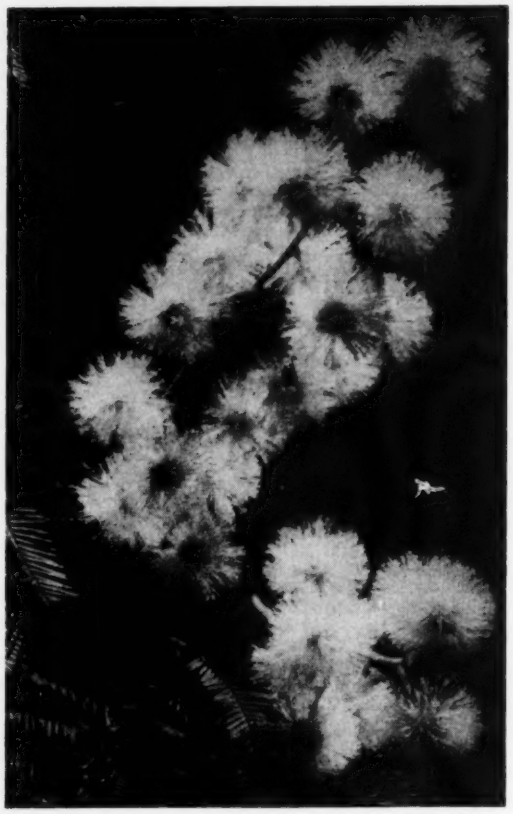

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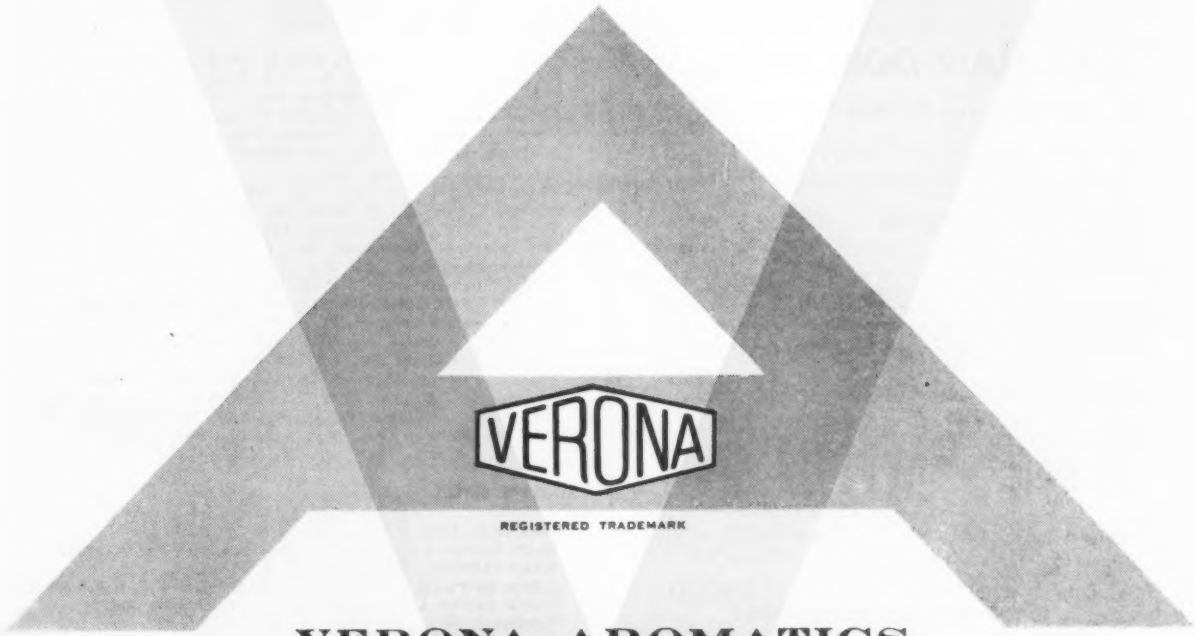

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POLISHES Monoethanolamine and Triethanolamine are used as the emulsifying agents in the preparation of all types of wax polishes for automobiles, furniture, floors, shoes and metals . . . as well as in various DISINFECTANT, TEXTILE SCOURING, INSECTICIDE, HERBICIDE AND DRY CLEANING formulations.

(SEE SPECIFICATIONS CHART ATTACHED) For further technical data, and for information on price and delivery, write us at address listed below.

SHIPPING STANDARDS — ALLIED TECHNICAL ETHANOLAMINES

	monoethanolamine	*diethanolamine*	*triethanolamine* Chemical Grade	*triethanolamine* 85% Grade
Specific Gravity 20/20°C	1.017-1.021	1.090-1.095*	1.1220-1.1300	1.1240-1.1290
Boiling Range — ASTM	I.B.P. 165°C min. D.P. 175° max.	— —	— —	— —
Color — APHA	20 max.	40 max.	100 max.	100 max.
Suspended Matter	Substantially Free	Substantially Free	Substantially Free	Substantially Free
Equivalent Weight	61-63	104-106	140-145	147-152
Odor	Mildly ammoniacal	—	Mildly ammoniacal	Mildly ammoniacal
Water	—	0.15 wt. % max.	0.5 wt. % max.	0.5 wt. % max.
MEA Content	—	1.0 wt. % max.	1.5 wt. % max.	—
DEA Content	—	98.50 wt. % min.	15.0 wt. % max.	—
TEA Content	—	1.0 wt. % max.	85.0 wt. % min.	98.0 wt. % min.
Iron	—	—	—	0.003 wt. % max.
		*30/20°C		

For specifications and local offices, see our insert in Chemical Materials Catalog, page 272A and in Chemical Week Buyers Guide, page 27.

Allied Chemical

NITROGEN DIVISION

Dept. EA 6-31-4, 40 Rector Street, New York 6, N. Y.

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Write Dept. S-13 for samples or 20 page comprehensive booklet "Oleic Acid Emeryfacts."

COLOR SPECIFICATIONS	Maximum Color		Maximum Color Stability	
	Photo. Index	Lovibond 5¼" (Y/R)	Photo. Index	Lovibond 5¼" (Y/R)
Emersol 233 LL Oleic Acid	11/0.5	3/0.5	32/4.5	10/3
Emersol 221 Low Titer White Oleic Acid	15/0.5	5.0/0.5	51/10.5	20/7

A little extra everything except price

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Enjay Chem. Co., 15 W. 51 St., N. Y. 19
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Jefferson Chem. Co., 1121 Walker Ave., Houston, Tex.
Missouri Solvents & Chemicals Co., 419 De Soto Ave., St. Louis
Ohio Solvents & Chemicals Co., 3470 W. 140th St., Cleveland
Olin Mathieson Chem. Corp., Org. Chems., 745 5th Ave., N. Y. C.
Robeco Chems. Inc., 25 E. 26st St., N .Y. 10
Southern Sols. & Chems. Co., 917 Jefferson Highway, New Orleans
Texas Solvents & Chemicals Co., 8501 Market St., Houston, Tex.
Toledo Sols. & Chems. Co., 4051 South Ave., Toledo, O.
Union Carbide Chems. Co., 270 Park Ave., N. Y.
Western Solvents & Chemicals Co., 6472 Selkirk Ave., Detroit
Wisconsin Solvents & Chemicals Corp., 1719 S. 83rd St., Milwaukee, Wisc.
Wolverine Solvents & Chemicals Co., 2940 Stafford Ave., SW, Grand Rapids, Mich.
Wyandotte Chemicals Corp., Mich. Alkali Div., Wyandotte, Mich.

THYLENE OXIDE

Allied Chem. Corp., Nitrogen Div., 40 Rector St., N. Y.
Antara Chemicals, 435 Hudson St., N. Y.
Continental Oil Co., 1270 Ave. of Americas, N. Y. 20
Dow Chemical Co., Midland, Mich.
Jefferson Chem. Co., 1121 Walker Ave., Houston, Tex.
Olin Mathieson Chem. Corp., Org. Chems., 745 5th Ave., N. Y. 22
Union Carbide Chems. Co., 270 Park Ave., N. Y.
Wyandotte Chemical Corp., Mich. Alkali Div., Wyandotte, Mich.

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Armour Industrial Chem. Co., 110 N. Wacker Dr., Chicago
Atlantic Refining Co., 260 S. Broad St., Philadelphia
Continental Chem. Co., 195 21 Ave., Paterson, N. J.
Continental Oil Co., 1270 Ave. of Americas, N .Y. 20
Dow Chem. Co., Midland, Mich.
Emery Industries, Inc., Carew Tower, Cincinnati
Pennsylvania Refining Co., Butler, Pa.
Sonneborn Chem. & Refin'g Corp., 300 4th Ave., N. Y.
Ultra Chem. Wks., 2 Wood St., Paterson, N. J.

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William Garrigue & Co., 9 S. Clinton St., Chicago
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G. Mazzoni, Busto Arsizio, Italy
Foster D. Snell, 29 W. 15th St., N. Y. 11
Wurster & Sanger, 5201 S. Kenwood Ave., Chicago

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Archer-Daniels-Midland Co., Minneapolis 2
Arizona Chem. Co., 30 Rockefeller Plaza, N. Y. 20
Armour Ind. Chem. Co., 110 N. Wacker Dr., Chicago
Baker Castor Oil Co., 40 Ave. A, Bayonne, N. J.
Capital City Prods. Co., 525 W. 1st St., Columbus 16, O.
Celina Stearic Acid Co., Celina, Ohio.
Concord Chem. Co., 205 S. 2nd St., Camden 1, N. J.
Cowles Chem. Co., 7016 Euclid Ave., Cleveland 3
Darling & Co., 4201 So. Ashland Ave., Chicago
Dehydag Deutsche Hydrierwerke, Dusseldorf, Germany
E. F. Drew & Co., 15 E. 26 St., N. Y. 10
Eastern Industries, Inc., Ridgefield, N. J.
Emery Industries, Inc., Carew Tower, Cincinnati 2
Foremost Food & Chem. Co., Oakland, Calif.
Glidden Co., Jacksonville 1, Fla.
A. Gross & Co., 295 Madison Ave., N. Y.
Harchem Div., 25 Main St., Belleville 9, N. J.
Hercules Powder Co., Wilmington
Heyden Chem. Div., Heyden-Newport Chem. Corp., 324 Madison Ave., N. Y. 17
Humko Chem. Dept., 501 Allwood Ave., Clifton, N. J.
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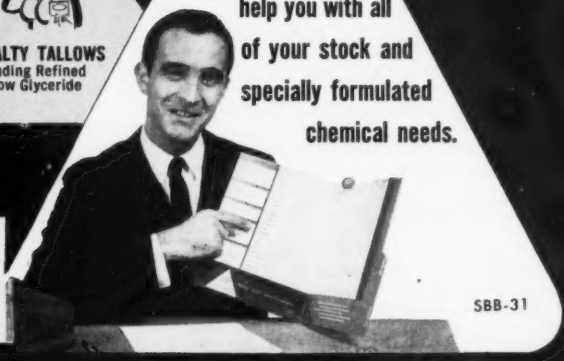

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Union Bag-Camp Paper Corp., 233 Broadway, N. Y.
Vegetable Oil Prods., 5568 E. 61 St., Los Angeles
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13
Wilson-Martin Div., Snyder Ave. & Swanson St., Phila.
Woburn Chemical Corp., 1200 Harrison Ave., Kearny, N. J.

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Darling & Co., 4201 S. Ashland Ave., Chicago 9
E. F. Drew & Co., 15 E. 26 St., N. Y. 10
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E. F. Drew & Co., 15 E. 26 St., N. Y. 10
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Hercules Powder Co., Wilmington, Del.
Heyden Chem. Div., Heyden-Newport Chem. Corp., 324 Madison Ave., N. Y. 17
Hodag Chem. Corp., 7247 N. Central Park Ave., Chicago 45
Kamen Soap Prods. Co., 5-22 50 Ave., L. I. C. 1, N. Y.
Kessler Chem. Co., State Rd. & Cottman Ave., Phila. 35
Marchon Prods., Ltd., Whitehaven, Cumberland, England.
National Southern Products, Tuscaloosa, Ala.
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Robinson, Wagner Co., 628 Waverly Ave., Mamaroneck, N. Y.
Onyx Chemical Corp., Warren & Morris Sts., Jersey City 2, N. J.
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Harchem Div., 25 Main St., Belleville 9, N. J.
Hodag Chem. Corp., 7247 N. Central Park, Chicago
Marchon Prods. Ltd., Whitehaven, Cumberland, England
M. Michel & Co., 90 Broad St., N. Y. 4
Robeco Chemicals, Inc., 25 E. 26 St., N. Y. 10
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Tamms Industries, Inc., 228 N. La Salle St., Chicago
Universal Marble Products, Thornwood, N. Y.
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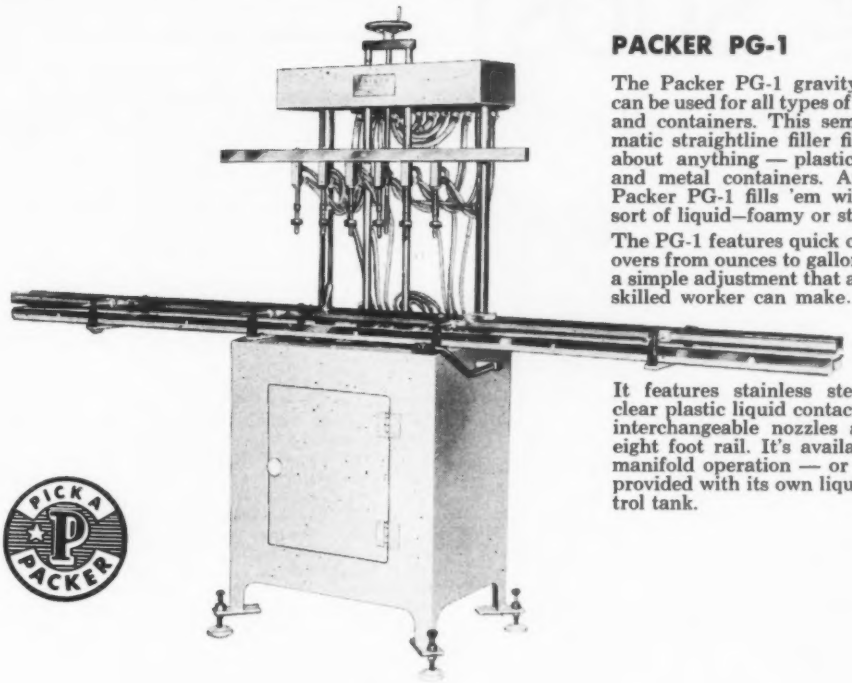

PACKER PG-1

The Packer PG-1 gravity filler, can be used for all types of liquids and containers. This semi-automatic straightline filler fills just about anything — plastic, glass and metal containers. And the Packer PG-1 fills 'em with any sort of liquid—foamy or still!

The PG-1 features quick change-overs from ounces to gallons with a simple adjustment that any unskilled worker can make.

It features stainless steel and clear plastic liquid contact parts, interchangeable nozzles and an eight foot rail. It's available for manifold operation — or can be provided with its own liquid control tank.

THE PG-1 FILLING MACHINE FOR ALL TYPES OF LIQUIDS AND CONTAINERS!

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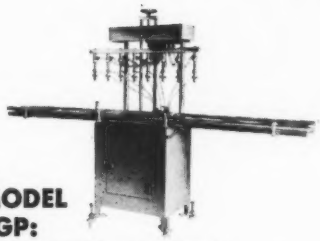

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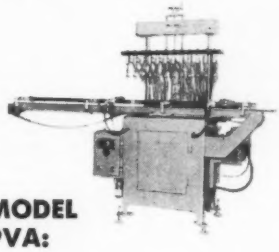
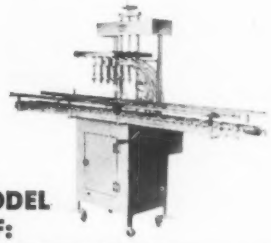
Equipped With Centrifugal Pump and Motor.
A semi-automatic gravity pressure filler. Equipped with centrifugal pump and motor. Handles all types of containers—including "F" style cans up to 2-gallon size.



MODEL PVA:

Fully automatic, straightline vacuum filler . . . no complicated gears, cams or starwheels to cause excessive "down-time" or inaccuracy in filling.



MODEL PCF:

Fills containers Right In Carton.
Fills containers inside the carton. Fully adjustable from ½ pint to gallon. For glass, metal and plastic containers. Vacuum, gravity. Has skate wheel conveyor for easy handling of cartons.

PACKER MACHINERY CORP.

109 14th St., Brooklyn 15, N. Y.
HY. 9-8850

Packer has a machine to meet any filling requirement . . . or Packer will design one for you.

Write for free catalog

IT'S Laub ENGINEERED

STOP SUDS!

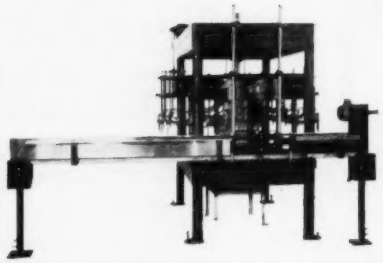
THE FIRST and ONLY — completely versatile

30/60 TUBE AUTOMATIC LIQUID FILLER

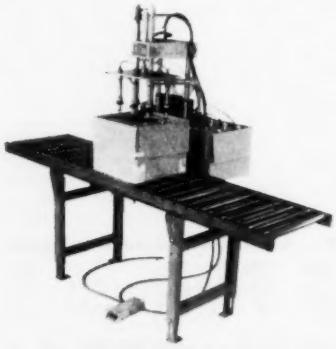
Change all product contact parts as well as container parts in minutes

Vacuum or pressure.

High speed performance at cost of low speed equipment.



Rated in excess of 400 per minute—100 GPM.



SIPHON-SIP CASE-AT-A-TIME FILLER

For Sudsing Products

Siphon-Sip is the most efficient way to pack.

No vacuum means *no suds.*

Siphon-Sip means *no drip.*

Case-at-a-Time means saving uncasing and casing labor.

Visual overflow means you *know* when all cans are full.

DIRECT-FROM-DRUM IN-LINE FILLER

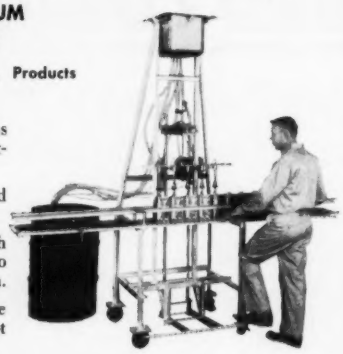
Fast changeover of Drums, Products and Containers.

Fills pints through gallons in glass, round plastic bottles and cans.

Excellent for sudsing and semi-viscous fluids.

Designed to drain dry with no puddles or low points to hold fluids at end of run.

Fumes are at an absolute minimum as air in and out of drum is balanced.



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LAUB ENGINEERING COMPANY

INDUSTRIAL AND MECHANICAL ENGINEERS

244 North San Marino Avenue • San Gabriel, Calif.

(Los Angeles County)

Phone: CUmberland 3-5617

FILLING MACHINERY (For Chips, Flakes) (Cont'd.)

John R. Nalbach Engr. Co., 6139 W. Ogden Ave., Chicago
Newman Tallow & Soap Machinery Co., 3601 S. Iron St., Chicago
National Equipment Co., 153 Crosby St., N. Y. 12
Thayer Scale Co., 1 Thayer Park, Pembroke, Mass.
Weigh Right Auto Scale Co., Mills Rd., Joliet, Ill.

FILLING MACHINERY (for Paste in cans, drums)

Arenco Mach. Co., 25 W. 43rd St., N. Y. 36
Arthur Colton Co., 3431 E. Lafayette, Detroit
FMC Packaging Mchy. Div., 4972 Summerdale Ave., Phila., Pa.
First Machy. Corp., 209 10 St., Bklyn. 15 (Used)
Girdler Process Equipment Div., Louisville, Ky.
G. Diehl Mateer Co., Wayne, Pa.
Karl Kiefer Machine Co., 919 Martin St., Cincinnati 2
Laub Engineering Co., 244 N. San Marino Ave., San Gabriel, Calif.
National Equipment Co., 153 Crosby St., N. Y. 12
Newman Tallow & Soap Machinery Co., 3601 S. Iron St., Chicago
Triangle Packaging Machy. Corp., 6643 W. Diversey Ave., Chicago
U. S. Bottlers Mchy. Co., 4019 N. Rockwell St., Chicago, Ill.

FILLING MACHINERY (dry products, powders, granules, etc.)

Arenco Machine Co., 25 W. 43rd St., N. Y. 36
Brown Filling Machine Co., Box 452, Ann Arbor, Mich.
Clybourn Machine Cor., 6479 N. Avondale Ave., Chicago 31
Consolidated Package Machy. Corp., 1400 West Ave., Buffalo, N. Y.
Exact Weight Scale Co., 538 E. Town St., Columbus, O.
First Machy. Corp., 209 10 St., Bklyn. 15 (Used)
FMC Packaging Mchy. Div., 4972 Summerdale Ave., Phila., Pa.
J. L. Ferguson Co., Joliet, Ill.
Paul L. Karstrom Co., 1824 W. 74th St., Chicago
G. Diehl Mateer Co., Wayne, Pa.
John R. Nalbach Engr. So., 6139 W. Ogden Ave., Chicago
National Equipment Co., 153 Crosby St., N. Y. 12
National Instrument Co., 4119 Fordleigh Rd., Baltimore
Newman Tallow & Soap Machinery Co., 3601 S. Iron St., Chicago
Pneumatic Scale Corp., Quincy 71, Mass.
Sprout, Waldron & Co., Muncy, Pa.
Stuyvesant Engineering Co., Norwood, N. J.
Sunstrand American Broach, Ann Arbor, Mich.
Thayer Scale Co., 1 Thayer Park, Pembroke, Mass.
Triangle Package Machinery Co., 6643 W. Diversey Ave., Chicago
U. S. Automatic Box Machy. Co., Boston 31, Mass.
Weigh Right Automatic Scale Co., Mills Rd., Joliet, Ill.
Wright Machy. Co., Durham, N. C.

FILLING MACHINERY (for Liquids in drums, carboys, large cans, etc.)

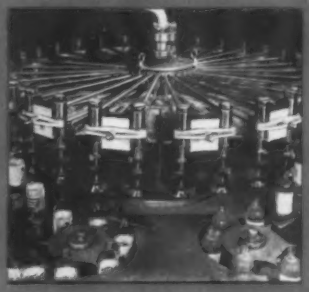
Alsop Engineering Corp., Milldale, Conn.
Anderson Bros. Mfg. Co., 1907 Kishwaukee St., Rockford, Ill.
Biner & Ellison, 1101 N. Main St., Los Angeles, Cal.
Chisholm Ryder Co., Hanover, Pa.
First Machy. Corp., 209 10 St., Bklyn. 15 (Used)
Horix Mfg. Co., 2609 Chartiers Ave., Pittsburgh 4
Karl Kiefer Machine Co., 923 Martin St., Cincinnati
Laub Engineering Co., 244 N. San Marino Ave., San Gabriel, Calif.
M-R-M- Co., 191 Berry St., Bklyn.
National Instrument Co., 4119 Fordleigh Rd., Baltimore
Newman Tallow & Soap Machy. Co., 3601 S. Iron St., Chicago (Used)
Packer Machinery Corp., 109 14th St., Bklyn.
Stuyvesant Engineering Co., 107 Stuyvesant Ave., Lyndhurst, N. J.
Terris Div., Consolidated Siphon Supply Co., 22 Wooster St., N. Y.
Triangle Package Machinery Co., 6643 W. Diversey Ave., Chicago
Thayer Scale Co., 1 Thayer Park, Pembroke, Mass.
U. S. Bottlers Mchy. Co., 4019 N. Rockwell St., Chicago, Ill.

FILLING MACHINERY (for Liquids and Semi-Liquids in Glass and Plastic Bottles, Small Cans)

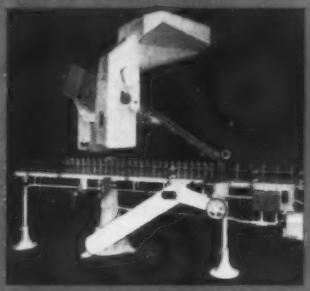
Alsop Engineering Corp., Milldale, Conn.
Chisholm Ryder Co., Hanover, Pa.
Arthur Colton Co., 3431 E. Lafayette, Detroit
Consolidated Packaging Machy. Corp., 1400 West Ave., Buffalo
Ertel Engineering Corp., W. Front St., Kingston, N. Y.
Filler Mach. Corp., 10 Penn Ave., Phila.
Filpaco Industries, 2464 S. Michigan Ave., Chicago
First Machy. Corp., 209 10 St., Bklyn. 15 (Used)
Girdler Process Equipment Div., Louisville, Ky.
Horix Mfg. Co., 2609 Chartiers Ave., Pittsburgh 4, Pa.
Karl Kiefer Machine Co., 919 Martin St., Cincinnati

Complete Bottling Equipment

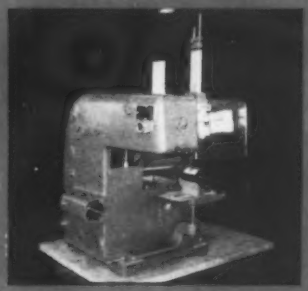
Vacuflow Jr. Powder Filler — readily adjusted to handle powders of different density. Rotary models available for speeds up to 300 per minute.



All Purpose Liquid Filler — one of several models for accurate filling without drip on both light and heavy liquids. Suitable for glass, plastic or metal containers.



Overcapper — automatic machine for applying friction closures of all types. Well adapted for aerosol containers. Full line of equipment for turn-on capping operations also available.



Colletta Bench Labeler — entirely simple to operate and quickly adjusted. Converted to automatic labeling by use of fitted attachments. Standard models available for speeds up to 300 per minute.

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MAIN OFFICE AND PLANT
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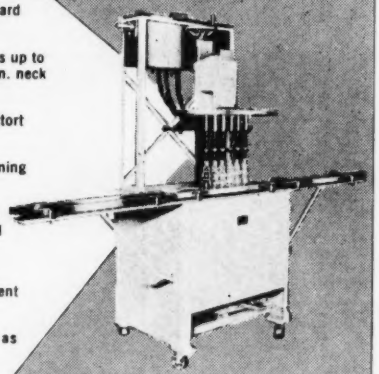
GRAVITY FILLER
MODEL EGR

Features:

1. Fills cans, plastic bottles and other standard containers
2. Will fill all containers up to 1 gal. capacity with min. neck openings of 7/16"
3. Won't collapse or distort containers
4. Better for filling foaming liquids
5. Parts in contact with liquid are stainless steel
6. Dripproof spouts
7. Lower initial investment and operating cost
8. Can also be supplied as conveyorized unit

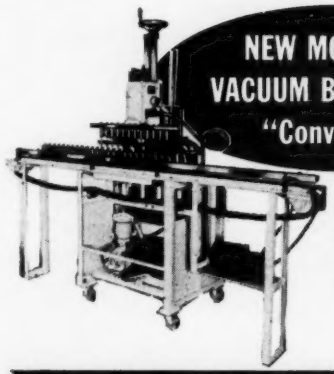


Simplicity of spout design enables quick dismantling and cleaning. Ertel specially designed spouts are known for their special seal and dripproof features. A unique arrangement provides for easy horizontal and vertical change over. Unit is foot pedal operated.

ERTEL ENGINEERING CORP.
WEST FRONT ST. KINGSTON, N. Y.
Mfrs. of Filters, Filter Sheets, Vacuum Bottle Fillers, Pumps, Mixers

Write for BULLETIN EGR for full description

NEW MODEL ESA-C
VACUUM BOTTLE FILLER
"Conveyorized"

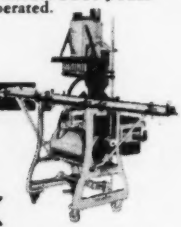


Also available without conveyor

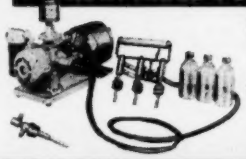
Conveyor has stainless steel, Nylon or steel chain plates. Single wheel spout rack control. Foot pedal operated.

LOW PRICED EMSA FILLER

Six or more open type spouts—with or without reservoir tanks and overflow system.



ADAPTABLE PORTABLE



For all bottle sizes with 1. D. neck openings 1/8" up—liquid contact parts either stainless steel, bronze alloy or plastic.

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Since 1932
ERTEL ENGINEERING CORPORATION
Liquid Handling Equipment Manufacturers Since 1932
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Laub Engineering Co., 244 N. San Marino Ave., San Gabriel, Calif.
G. Diehl Mateer Co., Wayne, Pa.
M. R. M. Co., 191 Berry St., Bklyn.
National Instrument Co., 4119 Fordleigh Rd., Baltimore
National Equipment Co., 153 Crosby St., N. Y. 12
Newman Tallow & Soap Machinery Co., 3601 S. Iron St., Chicago
Packer Machinery Corp., 109 14th St., Bklyn.
Perl Machine Mfg. Co., 68 Jay St., Bklyn. 1
Pneumatic Scale Corp., Quincy 71, Mass.
Scientific Filter Co., 59 Rose St., N. Y.
Terris Div. Consolidated Siphon Supply Co., 22 Wooster St., N. Y.
U. S. Bottlers Machy. Co., 4019 N. Rockwell St., Chicago

FILLING MACHINERY (for Pastes in Tubes)

Anderson Bros. Mfg. Co., 1907 Kishwaukee St., Rockford, Ill.
Arenco Mach. Co., 25 W. 43rd St., N. Y. 36
Arthur Colton Co., 3431 E. Lafayette Ave., Detroit
First Machy. Corp., 209 10 St., Bklyn. 15 (Used)
FMC Packaging Mchy. Div., 4972 Summerdale Ave., Phila., Pa.
Filpaco Industries, 2464 S. Michigan Ave., Chicago
Karl Kiefer Machine Co., 923 Martin St., Cincinnati
National Equipment Co., 153 Crosby St., N. Y. 12
National Instrument Co., 4119 Fordleigh Rd., Baltimore
Newman Tallow & Soap Machinery Co., 3601 S. Iron St., Chicago
Perl Mach. Mfg. Co., 68 Jay St., Brooklyn 1
F. J. Stokes Machine Co., 5918 Tabor Rd., Philadelphia

FILTERS, Clarifying

Alsop Engineering Corp., Milldale, Conn.
Ertel Engineering Corp., W. Front St., Kingston, N. Y.
Filpaco Industries, 2464 S. Michigan Ave., Chicago
Karl Kiefer Machy. Co., 919 Martin St., Cincinnati
Scientific Filter Co., 59 Rose St., N. Y.
Terris Div. Consolidated Siphon Supply Co., 22 Wooster St., N. Y.

FILTER AIDS

American Colloid Co., 5100 Suffield Ct., Skokie, Ill.
Dicalite Div., 612 S. Flower St., Los Angeles
Eagle-Picher Co., Cincinnati 1
Filtrol Corp., 3250 E. Washington Blvd., Los Angeles
Industrial Chem. Sales Div., 230 Park Ave., N. Y.
Johns-Manville Prods. Corp., 22 East 40th St., N. Y.
Peerless Clay & Mineral Co., Pueblo, Colo.
Whittaker, Clark & Daniels, 100 Church St., N. Y.

FILTER PRESSES

Alsop Eng. Corp., Milldale, Conn.
Ertel Engineering Corp., W. Front St., Kingston, N. Y.
Filpaco Industries, 2464 S. Michigan Ave., Chicago
First Machy. Corp., 209 10 St., Bklyn. 15 (Used)
F. R. Hormann & Co., 17 Stone St., Newark, N. J.
Karl Kiefer Machy. Co., 919 Martin St., Cincinnati
G. Mazzoni, Busto Arsizio, Italy
Newman Tallow & Soap Machinery Co., 3601 S. Iron St., Chicago
Scientific Filter Co., 59 Rose St., N. Y.
T. Shriver & Co., Harrison, N. J.
Sparkler Mfg. Co., 201 Lake St., Mundelein, Ill.
D. R. Sperry & Co., Batavia, Ill.
Terris Div. Consolidated Siphon Supply Co., 22 Wooster St., N. Y.
United Filter Corp., Hazelton, Pa.

FILTER SHEETS, Asbestos

Alsop Engineering Corp., Milldale, Conn.
Ertel Engineering Corp., West Front St., Kingston, N. Y.
Johns-Manville Prods. Corp., 22 E. 40th St., N. Y.
Scientific Filter Co., 59 Rose St., N. Y. 38

FIRE EXTINGUISHER FLUID

Diamond Alkali Co., Union Commerce Bldg., Cleveland
Dow Chem. Co., Midland, Mich.
James Good Co., 2107 E. Susquehanna Ave., Philadelphia
R. M. Hollingshead Corp., 840 Cooper St., Camden, N. J.
Michigan Chemical Corp., St. Louis, Mich.

Miranol Chemical Co., 277 Coit St., Irvington, N. J.
Prior Chem. Corp., 420 Lexington Ave., N. Y.
Stauffer Chem. Co., 380 Madison Ave., N. Y.
Tex-ite Prods. Corp., 859 E. 43 St., Brooklyn
Uncle Sam Chemical Co., 577 W. 131st St., N. Y.

FIRE-PROOFING COMPOUNDS

American Potash & Chemical Corp., 3030 W. 6 St., Los Angeles
Antara Chemicals Div., 435 Hudson St., N. Y. 14
Atlantic Refining Co., 260 S. Broad St., Phila.
Chem. Service of Balto., Howard & West Sts., Balto. 30
Chicago Sanitary Prods., Co., 3100 S. Throop St., Chicago
Clarkson Laboratories, 1450 Ferry Ave., Camden, N. J.
Diamond Alkali Co., Union Commerce Bldg., Cleveland
Dow Chemical Co., Midland, Mich.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Emkay Chem. Co., 319 2nd St., Elizabeth, N. J.
Essential Chemicals Co., 5906 N. Port Washington Rd., Milwaukee
Finetex, Inc., 418 Falmouth Ave., East Paterson, N. J.
Fuld Bros., 702 S. Wolfe St., Baltimore
Geigy Industrial Chemicals, Ardsley, N. Y.
Glyco Chemicals Div., 417 5th Ave., N. Y. 1
Hooker Chem. Corp., Union St., Niagara Falls, N. Y.
Hysan Products Co., 930 W. 37th Place, Chicago
Johns-Manville Prods. Corp., 22 E. 40th St., N. Y.
Klix Chem. Co., 551 Railroad Ave., S. San Francisco
Metal & Thermit Corp., Rahway, N. J.
Monsanto Chemical Co., St. Louis, Mo.
Niacet Chemicals Corp., Niagara Falls, N. Y.
Onyx Chemical Corp., Warren & Morris Sts., Jersey City, N. J.
Quaker Chem. Prods. Corp., Conshohocken, Pa.
Theobald Industries, P. O. Box 72, Harrison N. J.
U. S. Borax & Chem. Corp., 50 Rockefeller Plaza, N. Y.
Victor Chemical Works, 155 N. Wacker Dr., Chicago

FISH OIL SOAP (see Soap, Fish Oil)

FISH OILS

Archer-Daniels-Midland Co., Minneapolis, Minn.
Armour Industrial Chem. Co., 110 N. Wacker Dr., Chicago
Hasselman, Seaman, de Ryss, Inc., 347 Madison Ave., N. Y. 17
Haynie Prods. Inc., 108 E. York St., Baltimore
Murray Oil Products Co., 21 West St., N. Y.
Pacific Vegetable Oil Co., 1145 S. 10th St., Richmond, Calif.
J. H. Redding, Inc., 17 Battery Place, N. Y.
Robeco Chemicals, Inc., 25 E. 26 St., N. Y. 10
Vegetable Oil Prods., 5568 E. 61st St., Los Angeles
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13

FLOOR FINISHES (Non-Wax)

ABC Compounding Co., Oakcliffe & Harwell Rds., Atlanta, Ga.
B & W Chem. Co., 25920 Belle Porte Ave., Harbor City, Calif.
Baird & McGuire, Holbrook, Mass.
Betco Corp., 830 Elysian Ave., Toledo, O.
Bixon Chem. Corp., 1163 Southern Blvd., N. Y. 59
Buckingham Wax Co., 51-03 Van Dam St., L. I. City, N. Y.
Butcher Polish Co., 183 Commercial St., Malden, Mass.
Candy & Co., 2515 W. 35th St., Chicago
Cato Chem. Co., 116 S. York St., Elmhurst, Ill.
Chemical Concentrates, Ft. Washington, Pa.
Chem. Service of Balto., Howard & West Sts., Balto.
Chicago Sanitary Prods. Co., 3100 S. Throop St., Chicago
Concord Chem. Co., 205 S. 2nd St., Camden, N. J.
Davies-Young Soap Co., Dayton, O.
Dettelbach Chem. Corp., 4111 Peachtree Rd., Atlanta 19
Du-Ev Products Co., 630 Driggs Ave., Brooklyn, N. Y.
Dura Wax Co., McHenry, Ill.
Essential Chems. Co., 5906 N. Port Washington Rd., Milwaukee
Federal Varnish Division, S. Ashland Ave., at 29th St., Chicago
Freesmeier Laboratories, 3661 Windsor Pl., St. Louis 13
Frontier Chem. Prods., 119 E. Soper St., St. Louis 11
Fuld Bros., 702 S. Wolfe St., Baltimore
James Good Co., 2107 E. Susquehanna Ave., Philadelphia
Haag Labs, 14000 S. Seeley Ave., Blue Island, Ill.
Higley Chemical Co., Dubuque, Iowa
R. M. Hollingshead Corp., Camden, N. J.
Hysan Products Co., 930 W. 37th Place, Chicago
S. C. Johnson & Son, Inc., Racine, Wis.
Klix Chem. Co., 551 Railroad Ave., S. San Francisco
Magee Chem. Co., 325 Main St., Bensenville, Ill.
Masury Young Co., 76 Roland St., Boston 29
McAleer Mfg. Corp., 101 S. Waterman Ave., Detroit 17

ARTHUR **COLTON** COMPANY
3491 E. Lafayette, Detroit 7, Michigan
60—9

ARTHUR **COLTON** COMPANY
3472 E. Lafayette, Detroit 7, Michigan

FLOOR FINISHES (Non-Wax) (Cont'd.)

Midland Labs., Dubuque, Iowa
Oil Specialties & Refining Co., 18 Bridge St., Bklyn
Peck's Products Co., 610 E. Clarence Ave., St. Louis
Puro Co., 2801 Locust St., St. Louis 3
Purex Corp., Box 9686, Philadelphia, Pa.
W. T. Rawleigh Co., Freeport, Ill.
Simoniz Co., 2100 Indiana Ave., Chicago 16
Sonneborn Chem. & Refining Corp., 300 Park Ave., S., N. Y.
Southern Chemical Prods. Co., 170 Poplar St., Macon, Ga.
Tex-ite Prods. Corp., 859 E. 43 St., Bklyn. 10
Textilana Corp., 12607 Cerise Ave., Hawthorne, Calif.
Trio Chemical Wks., 341 Scholes St., Bklyn. 6
Uncle Sam Chemical Co., 577 W. 131st St., N. Y.
U. S. Sanitary Spec. Corp., 1001 S. Calif., Chicago 12
James Varley & Sons, 1200 Switzer Ave., St. Louis
T. F. Washburn Co., 2244 Elston Ave., Chicago
Windsor Wax Co., 611 Newark St., Hoboken, N. J.
Wyandotte Chems. Corp., J. B. Ford Div., Wyandotte, Mich.

FLOOR SCRUB SOAPS (see Soap, Potash)

FLOOR SEALERS

Buckingham Wax Co., 51-03 Van Dam St., Lon Island City, N. Y.
Chem. Service of Balto., Howard & West Sts., Balto.
Chicago Sanitary Prods. Co., 3100 Throop St., Chicago
Concord Chem. Co., 205 S. 2 St., Camden, N. J.
Davies-Young Soap Co., Dayton, O.
Du-Ev Products Co., 630 Driggs Ave., Brooklyn, N. Y.
Federal Varnish Division, S. Ashland Ave., at 29th St., Chicago
Freesmeier Laboratories, 3661 Windsor Pl., St. Louis 13
McAleer Mfg. Corp., 101 S. Waterman Ave., Detroit 17
Fuld Brothers, 702 S. Wolfe St., Baltimore
Hysan Products Co., 930 W. 38th Place, Chicago
Peck's Products Co., 610 Clarence Ave., St. Louis 15
Purex Corp., Box 9686, Philadelphia, Pa.
Sonneborn Chem. & Refining Corp., 300 Park Ave., S., N. Y.
Tex-ite Prods. Corp., 859 E. 43 St., Bklyn. 10
Uncle Sam Chemical Co., 577 W. 131st St., N. Y.
T. F. Washburn Co., 2244 Elston Ave., Chicago

FLOOR WAX APPLICATORS (see Applicators)

FLOOR WAXES

ABC Compounding Co., Oakcliffe & Harwell Rds., Atlanta, Ga.
B & W Chem. Co., 25920 Belle Porte Ave., Harbor City, Calif.
Baird & McGuire, Inc., Holbrook, Mass.
Betco Corp., 830 Elysian Ave., Toledo, O.
Bixon Chem. Corp., 1163 Southern Blvd., N. Y. 59
Buckingham Wax Corp., Van Dam St. & Borden Ave., L. I. City, N. Y.
Butcher Polish Co., 183 Commercial St., Malden, Mass.
Candy & Co., 2515 W. 35th St., Chicago
Cary Mfg. Co., 3559 Sweetwater Rd., Lemon Grove, Calif.
Cato Chemical Co., 116 S. York St., Elmhurst, Ill.
Chemical Concentrates, Ft. Washington, Pa.
Chemical Service of Balto., Howard & West Sts., Balto.
Chicago Sanitary Prods., Co., 3100 S. Throop St., Chicago
Concord Chem. Co., 205 S. 2nd St., Camden, N. J.
Davies-Young Soap Co., Dayton, O.
Dettelbach Chem. Corp., 4111 Peachtree Rd., Atlanta 19
Du-Ev Products Co., 630 Driggs Ave., Brooklyn, N. Y.
Dura Wax Co., McHenry, Ill.
Emulso Corp., 301 Ellicott St., Buffalo, N. Y.
Essential Chems. Co., 5906 N. Port Washington Rd., Milwaukee
Federal Varnish Division, S. Ashland Ave., at 29th St., Chicago
Freesmeier Laboratories, 3661 Windsor Pl., St. Louis 13
Frontier Chem. Prods., 119 E. Soper St., St. Louis
Fuld Bros., 702 S. Wolfe St., Baltimore
James Good, Inc., 2107 Susquehanna Ave., Phila.
Golden Star Polish Mfg. Co., 2901 E. 13th St., Kansas City, Mo.
Haag Laboratories, Inc., 14000 Seeley Ave., Blue Island, Ill.
Harley Soap Co., Pearce & Orthodox Sts., Philadelphia
Higley Chemical Co., Dubuque, Iowa
R. M. Hollingshead Corp., Camden, N. J.
Hysan Products Co., 930 W. 38th Place, Chicago
S. C. Johnson & Son, Racine, Wisc.
Klix Chemical Co., 551 Railroad Ave., S. San Francisco
Magee Chem. Co., 325 W. Main St., Bensenville, Ill.
National Chem. Laboratories, 825 Lombard St., Phila.

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LIQUID SOAPS
PARA BLOCKS
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STEER A STEADY COURSE with CANDY PRODUCTS

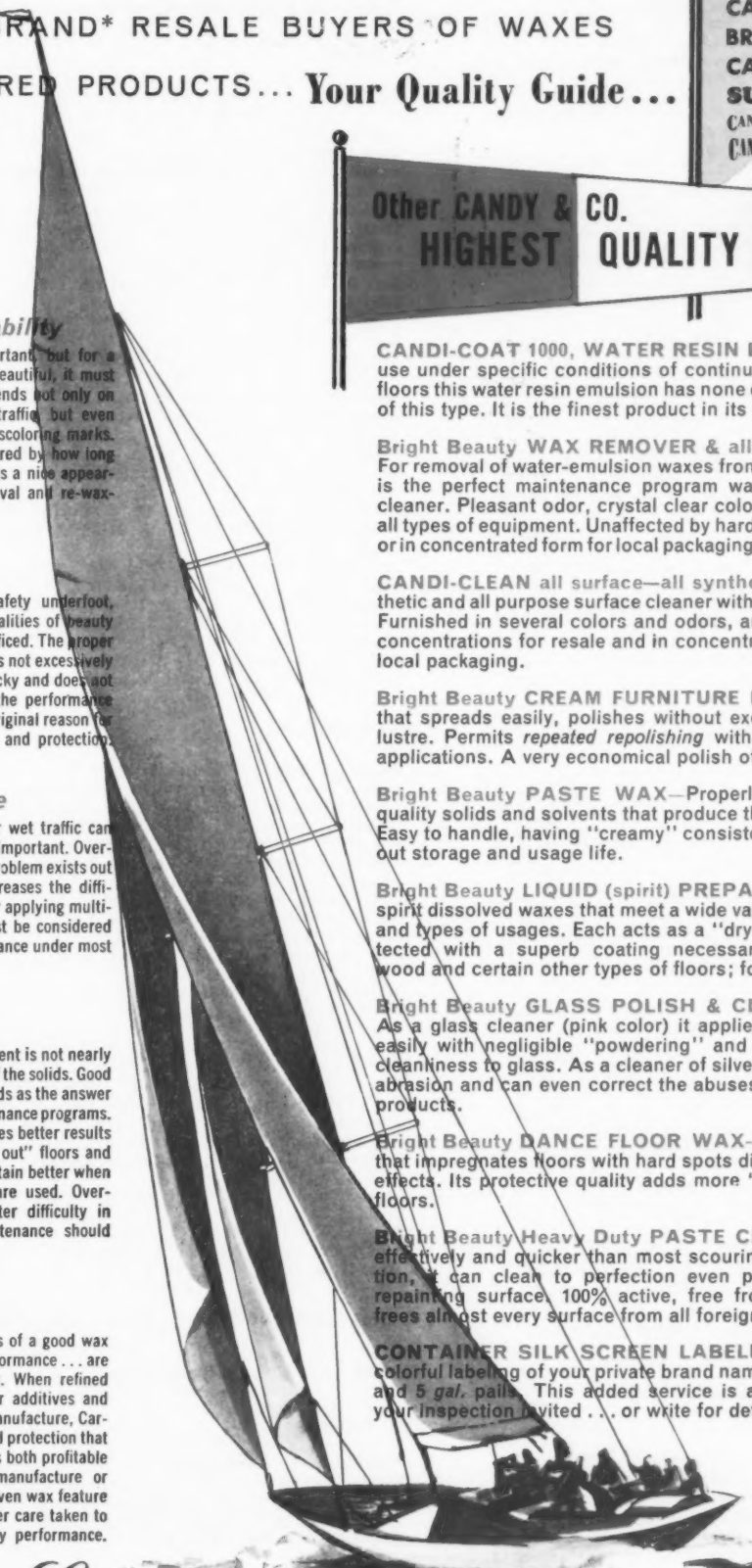
PRIVATE BRAND* RESALE BUYERS OF WAXES AND KINDRED PRODUCTS... **Your Quality Guide...**

WATER EMULSION WAXES

Each of Candy's floor waxes are all-around top quality for certain traffic conditions. They impart the finest protection and beauty to floors for which best suited.

CANDY'S SUPREME (standard)
BRIGHT BEAUTY®
CANDY'S SUPREME Special WR
SUPER CAND-DOX®
CAND-DOX® #CS
CANDI-WAX #6000

Other CANDY & CO. HIGHEST QUALITY PRODUCTS



CANDI-COAT 1000, WATER RESIN EMULSION—As a floor coating for use under specific conditions of continued maintenance on certain types of floors this water resin emulsion has none of the faults associated with coatings of this type. It is the finest product in its class produced up to this time.

Bright Beauty WAX REMOVER & all-purpose SURFACE CLEANER—For removal of water-emulsion waxes from any floor without harmful effects. It is the perfect maintenance program wax remover and all-purpose surface cleaner. Pleasant odor, crystal clear color and thorough cleaning action with all types of equipment. Unaffected by hard freezing. Furnished ready for resale or in concentrated form for local packaging . . . nothing but water to buy or mix in.

CANDI-CLEAN all surface—all synthetic CLEANER—This is an all synthetic and all purpose surface cleaner with free rinse and free wipe off qualities. Furnished in several colors and odors, and properly priced. Available in two concentrations for resale and in concentrated form for dilution with water for local packaging.

Bright Beauty CREAM FURNITURE POLISH—A cream furniture polish that spreads easily, polishes without excessive effort to a deep impressive lustre. Permits *repeated repolishing* with a dry cloth, thus saving many re-applications. A very economical polish of the very highest quality.

Bright Beauty PASTE WAX—Properly blended and refined from excellent quality solids and solvents that produce the best drying time and evaporation. Easy to handle, having "creamy" consistency and stability that lasts throughout storage and usage life.

Bright Beauty LIQUID (spirit) PREPARED WAXES—A complete line of spirit dissolved waxes that meet a wide variety of demands for durability, color and types of usages. Each acts as a "dry cleaner" to keep surfaces wax protected with a superb coating necessary for many applications such as wood and certain other types of floors; for bars, wallpaper, etc.

Bright Beauty GLASS POLISH & CLEANER and SILVER POLISH—As a glass cleaner (pink color) it applies evenly with little effort, wipes off easily with negligible "powdering" and produces an undeniable "feel" of cleanliness to glass. As a cleaner of silver, it polishes to a high lustre *without* abrasion and can even correct the abuses of scratchy "quick-polish" inferior products.

Bright Beauty DANCE FLOOR WAX—Does not "ball-up" and gather dirt that impregnates floors with hard spots difficult to remove . . . free from dusty effects. Its protective quality adds more "floor-years" to expensive ballroom floors.

Bright Beauty Heavy Duty PASTE CLEANER— *Cleans* and *scours* more effectively and quicker than most scouring powders. Depending on application, it can clean to perfection even painted walls to provide a suitable repainting surface. 100% active, free from excessive abrasive qualities, it frees almost every surface from all foreign matter.

CONTAINER SILK SCREEN LABELING—Now you can have dramatic, colorful labeling of your private brand name on all 55, 35, 30, 20 & 15 *gal.* drums and 5 *gal.* pails. This added service is accomplished right in our plant . . . your inspection invited . . . or write for details.

*All Candy's products are available for private brand resale and are sold only through distributors except for experimental accounts in Chicago essential to research.

Beauty and Durability

Initial appearance is important, but for a waxed surface to remain beautiful, it must be durable. Durability depends not only on resistance to abrasion of traffic, but even more so on resistance to discoloring marks. Durability should be measured by how long the waxed surface maintains a nice appearance before complete removal and re-waxing is required.

Anti-Slip

Anti-slip, or reasonable safety underfoot, does not mean that the qualities of beauty and protection need be sacrificed. The proper balance—a wax film which is not excessively slippery, yet which is not tacky and does not collect dirt readily—gives the performance that answers the foremost original reason for use of a floor wax—beauty and protection.

Water Resistance

Frequent damp mopping or wet traffic can make water resistance very important. Over-doing this quality when no problem exists out of the ordinary, simply increases the difficulty of complete removal or applying multiple coats. Removability must be considered as important as water-resistance under most normal conditions.

Solid Content

The percentage of solid content is not nearly as important as the **quality** of the solids. Good quality indicates 12% of solids as the answer for most well planned maintenance programs. Two applications of 12% gives better results than one of 18%. "Washed out" floors and other special problems maintain better when more concentrated waxes are used. Over-waxing and resultant greater difficulty in removal for periodic maintenance should be avoided.

Carnauba Wax

The most important features of a good wax . . . all-around quality of performance . . . are built around Carnauba Wax. When refined and compounded with other additives and scientifically controlled in manufacture, Carnauba imparts the beauty and protection that makes the use of floor waxes both profitable and possible. Make-shift manufacture or over-emphasis on any one given wax feature should be avoided and proper care taken to provide for most satisfactory performance.

Candy & Company, Inc.

EST. 1891

Wax Specialists for over 65 years

2515 W. 35th ST., CHICAGO 32

FLOOR WAXES (Cont'd.)

Majestic Wax Co., 2139 Blake St., Denver, Colo.
McAleer Mfg. Corp., 101 S. Waterman Ave., Detroit 17
Midland Labs., Dubuque, Iowa
M. & H. Laboratories, 2703 Archer Ave., Chicago
Masury Young Co., 76 Roland St., Boston 29
National Laboratories, Inc., 4934 Lewis Ave., Toledo, O.
New Jersey Chem. Co., 56 Park Ave., Lyndhurst, N. J.
Oil Specialties & Refining Co., 18 Bridge St., Bklyn.
Peck's Prods., 610 E. Clarence Ave., St. Louis
Perrow Chemical Co., Hurt, Va.
Piatt & Smillie Chems., 3419 Gratiot Ave., St. Louis, Mo.
Purex Corp., Box 9686, Philadelphia, Pa.
Puro Co., 2801 Locust St., St. Louis 3
Reily Chemical Co., P. O. Box 98, New Orleans, La.
Sanders Chem. Co., 2205 N. American St., Phila. 33
I. Schneid, Inc., 765 Talbert Ave., Atlanta, Ga.
Simoniz Co., 2100 Indiana Ave., Chicago 16
Southern Chemical Prods. Co., 170 Poplar St., Macon, Ga.
Sonneborn Chem. & Refin'g Corp., 300 4th Ave., N. Y. 10
John C. Stalfort & Sons, 319 W. Pratt St., Baltimore
John T. Stanley Co., 642 W. 30th St., N. Y.
Tex-ite Prods. Corp., 859 E. 43 St., Bklyn. 10
Trio Chem. Wks., 341 Scholes St., Bklyn.
Uncle Sam Chemical Co., 577 W. 131st St., N. Y.
U. S. Sanitary Specialties Corp., 1001 S. California Ave., Chicago 12
James Varley & Sons, 1200 Switzer Ave., St. Louis
T. F. Washburn Co., 2244 Elston Ave., Chicago
Windor Wax Co., Inc., 611 Newark St., Hoboken, N. J.
Wyandotte Chemicals Corp., J. B. Ford Div., Wyandotte, Mich.

FLOOR WAXES, Germicidal

Buckingham Wax Co., 51-03 Van Dam St., Long Island City, N. Y.
Chemical Concentrates, Ft. Washington, Pa.
Chemical Service of Baltimore, Howard & West Sts., Baltimore
Fuld Bros., 702 S. Wolfe St., Baltimore 31
Hysan Products Co., 930 W. 38th Place, Chicago
Trio Chemical Works., Inc., 341 Scholes St., Brooklyn
Sonneborn Chem. & Refining Corp., 300 Park Ave. S., N. Y.
Tex-ite Prods. Corp., 859 E. 43 St., Bklyn. 10
T. F. Washburn Co., 2244 Elston Ave., Chicago
Windsor Wax Co., 611 Newark St., Hoboken, N. J.

FLOOR WAXES, Insecticidal

Buckingham Wax Co., 51-03 Van Dam St., Long Island City, N. Y.
Chemical Concentrates, Ft. Washington, Pa.
Hysan Prods. Co., 930 W. 38th Pl., Chicago
New Jersey Chem. Co., 56 Park Ave., Lyndhurst, N. J.
Purex Corp., Box 9686, Philadelphia, Pa.
Sonneborn Chem. & Refining Corp., 300 Park Ave. S., N. Y.
Tex-ite Prods. Corp., 859 E. 43 St., Bklyn. 10
T. F. Washburn Co., 2244 Elston Ave., Chicago
Windsor Wax Co., 611 Newark St., Hoboken, N. J.

FLUORIDES

American Agricultural Chem. Co., 100 Church St., N. Y.
American Fluoride Corp., 151 W. 19th St., N. Y.
Blockson Chemicals, Joliet, Ill.
California Spray-Chemical Corp., Richmond, Calif.
Dow Chem. Co., Midland, Mich.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Harshaw Chemical Co., 1945 97th St., Cleveland
Merck & Co., Rahway, N. J.
Metal & Thermit Corp., Rahway, N. J.
Olin Mathieson Chem. Corp., Org. Chems., 745 5 Ave., N. Y.
Pennsalt Chems. Corp., 3 Penn Center, Phila. ,
Riches-Nelson, Inc., 342 Madison Ave., N. Y. 17
Robeco Chemicals, Inc., 25 E. 26 St., N. Y. 10
Stauffer Chem. Co., 380 Madison Ave., N. Y.
Jos. Turner & Co., Ridgefield, N. J.
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13

FLY BAITS

Agricultural Specialties, 12200 Denton Dr., Dallas, Tex.
S. B. Penick & Co., 100 Church St., N. Y. 8
United-Heckathorn, 600 S. 4 St., Richmond, Calif.

FLYPAPER and RIBBONS

Aeroxon Sales Co., 9 E. 38th St. N. Y.
Fly-Cord, Inc., Box 2006, Savannah, Ga.
Tanglefoot Co., 314 Straight Ave., S.W., Grand Rapids, Mich.
R. E. Tongue & Bro., Allegheny and Amber Sts., Phila.

FLY SPRAYS

A-M-R Chem. Co., 985 E. 35th St., Bklyn. 10
Averil, Inc., 6780 NW 37 Ct., Miami, Fla.
B & W Chem. Co., 25920 Bellel Porte Ave., Harbor City, Calif.
Baird & McGuire, Inc., Holbrook, Mass.
Barnett Chem. Prods. Co., 326 Lafayette Bldg., Phila. 6
California Spray-Chemical Corp., Richmond, Calif.
Chemical Service of Balitmore, Howard & West Sts., Baltimore 30
Chicago Sanitary Prod. Co., 3100 S. Throop St., Chicago 8
Exterminating Materials Co., 555 W. 22nd St., N. Y.
Freesmeier Laboratories, 3661 Windsor Pl., St. Louis 13
Food Machy. & Chem. Corp., 441 Lexington Ave., N. Y.
Geigy Agricultural Chemicals, Ardsley, N. Y.
Higley Chemical Co., Dubuque, Iowa
R. M. Hollingshead Corp., Camden, N. J.
Hub States Chems. & Equipment, 1255 N. Windsor St., Indianapolis
Hysan Prods. Co., 930 W. 38th Pl., Chicago
Kamen Soap Prods. Co., 5-22 50 Ave., L. I. C. 1, N. Y.
Kemiko Mfg. Co., 500 Chancellor Ave., Irvington, N. J.
Klix Chem. Co., 551 Railroad Ave., S. San Francisco
Miller Prods. Co., Portland 1, Ore.
New Jersey Chem. Co., 56 Park Ave., Lyndhurst, N. J.
S. B. Penick & Co., 100 Church St., N. Y. 8
Private Brands, Inc., 300 S. 3rd St., Kansas City, Kan.
Prentiss Drug & Chem. Co., 101 W. 31 St., N. Y. 1
Residex Corp., Clark, N. J.
Southern Chemical Prods. Co., 170 Poplar St., Macon, Ga.
Stauffer Chem. Co., 380 Madison Ave., N. Y.
Stevens-Wiley Mfg. Co., 1601 W. Glenwood Ave., Phila. 32
Tex-ite Prods. Corp., 859 E. 43 St., Brooklyn
Trio Chemical Wks., 341 Scholes St., Bklyn. 6
Uncle Sam Chemical Co., 577 W. 131st St., N. Y.
United-Heckathorn, 600 S. 4 St., Richmond, Calif.

FOAM STABILIZERS

Antara Chemicals, 435 Hudson St., N. Y.
Ardmore Chem. Co., 840 Valley Brook Ave., Lyndhurst, N. J.
Armour Industrial Chem. Co., 110 N. Wacker Dr., Chicago
Clintwood Chem. Co., 33 N. LaSalle St., Chicago 2
Commercial Solvents Corp., 260 Madison Ave., N. Y.
Continental Chem. Co., 195 21 Ave., Paterson, N. J.
Dehydag Deutsche Hydrierwerke, Dusseldorf, Germany
Fine Organics, Inc., 205 Main St., Lodi, N. J.
Glyco Chemicals Div., 417 5th Ave., N. Y.
Hercules Powder Co., Wilmington, Del.
Intex Chem. Corp., 167 Main St., Lodi, N. J.
Kessler Chem. Co., State Rd., Phila. 45
M. Michel & Co., 90 Broad St., N. Y. C.
Metal & Thermit Corp., Rahway, N. J.
Nopco Chem. Co., 60 Park Pl., Newark 1, N. J.
Onyx Chemical Corp., Warren & Morris Sts., Jersey City, N. J.
Pilot Chem. Co., 11756 Burke St., Santa Fe Springs, Calif.
Process Chems. Co., 8733 S. Dice Rd., Santa Fe Springs, Calif.
Refined Prods. Corp., 624 Schuyler Ave., Lyndhurst, N. J.
Silicones Div., Union Carbide Corp., 270 Park Ave., N. Y.
Sole Chem. Corp., 7740 S. Chicago Ave., Chicago 19
Stepan Chem. Co., 427 W. Randolph St., Chicago
Swift & Co., Chicago
Tanatex Chem. Corp., Belleville Turnpike, Kearny, N. J.
Textilana Corp., 12607 Cerise Ave., Hawthorne, Calif.
Treplow Chem. Co., 100 New St., Paterson, N. J.
Ultra Chem. Wks., 2 Wood St., Paterson, N. J.
Witco Chem. Co., 122 E. 42 St., N. Y. 17

FOAMING AGENTS (see Detergents, Synthetic; also Surface Active Agents)

FOGGING EQUIPMENT (See Sprayers, Fogging)

FOIL, Plain Metal

Aluminum Co. of America, Pittsburgh, Pa.
Cochran Foil Co., Louisville, Ky.
Johnson Foil Mfg. Co., South Broadway, St. Louis 11
Kaiser Aluminum & Chem. Sales, Oakland, Calif.
Republic Foil & Metal Mills, Danbury, Conn.

Reynold Metals Co., Richmond, Va.
Stanahan Foil Co., Hackensack, N. J.

FOIL, Printed and Decorated

Continental Can Co., 100 E. 42nd St., N. Y. 17
Crown Zellerbach Corp., San Leandro, Calif.
Lachman-Novasel Owens Paper Corp., 109 Greene St., N. Y.
Marathon Corp., Menasha, Wisc.
Milprint, Inc., Milwaukee 1, Wisc.
Reynold Metals Co., Richmond, Va.
Western Foil Co., 3010 38th Ave., Seattle, Wash.

FORMALDEHYDE (see also Brokers and Dealers)

Allied Chem. Corp., Nitrogen Div., 40 Rector St., N. Y.
Celanese Corp. of America, 180 Madison Ave., N. Y.
Cliffs-Dow Chem. Co., Marquette, Mich.
Commercial Solvents Corp., 260 Madison Ave., N. Y.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Hercules Powder Co., Wilmington
Heyden Chem. Div., Heyden-Newport Chem. Corp., 324 Madison Ave., N. Y. 17
Mallinckrodt Chemical Works, St. Louis, Mo.
Merck & Co., Rahway, N. J.
Monsanto Chemical Co., St. Louis, Mo.
Reichhold Chemicals, Inc., White Plains, N. Y.
Robeco Chemicals, Inc., 25 E. 26 St., N. Y. 10
Jos. Turner & Co., Ridgefield, N. J.
Union Carbide Chems. Co., 270 Park Ave., N. Y.

FORMULATIONS, Private Brand (see listings under individual headings)

FRAMES (Soap Frames)

Houchin Division, 300 Straight St., Paterson, N. J.
G. Mazzoni, Busto Arsizio, Italy
Littleford Bros., 451 E. Pearl St., Cincinnati
Mecchaniche Moderne, Corso Sempione 51, Busto Arsizio, Italy
Newman Tallow & Soap Machy. Co., 3601 S. Iron St., Chicago (Used)
Henry Simon Ltd., Stockport, England

"FREON" (Fluorinated Hydrocarbon Propellants)

E. I. du Pont de Nemours & Co., Wilmington, Del.

FULLERS EARTH

Chas. B. Chrystal Co., 53 Park Pl., N. Y.
Filtrol Corp., 3250 E. Washington Blvd., Los Angeles
Harshaw Chemical Co., 1945 E. 97th St., Cleveland
Industrial Chem. Sales Div., 230 Park Ave., N. Y.
Johns-Manville Corp., 22 E. 40 St., N. Y. C.
Minerals & Chemicals Philipp Corp., Menlo Park, N. J.
Robeco Chemicals, Inc., 25 E. 26 St., N. Y. 10
Tamms Industries, Inc., 228 N. La Salle St., Chicago
United Clay Mines Corp., 101 Oakland St., Trenton, N. J.
Charles A. Wagner Co., 4455 N. 6th St., Phila.
Whittaker, Clark & Daniels, 100 Church St., N. Y.

FUMIGANTS (Cyanides, Chlorpicrin, Methyl Bromide, etc)

American-British Chem. Supplies, 180 Madison Ave., N. Y.
American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
Amer. Potash & Chem. Corp., 3030 W. 6th St., Los Angeles, Calif.
Calif. Spray-Chemical Corp., Richmond, Calif.
Commercial Solvents Corp., 260 Madison Ave., N. Y.
Diamond Alkali Co., Union Commerce Bldg., Cleveland
Dow Chemical Co., Midland, Mich.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Food Machy. & Chem. Corp., 161 E. 42 St., N. Y.
Frontier Chem. Co., Wichita, Kan.
Geigy Agricultural Chemicals, Ardsley, N. Y.
Jefferson Chem. Co., 1121 Walker Ave., Houston
Kolker Chem. Corp., 600 Doremus Ave., Newark 5
Monsanto Chemical Co., St. Louis, Mo.
Morton Chem. Co., 110 N. Wacker Dr., Chicago 6
Rohm & Haas Co., Inc., 222 W. Washington Sq., Philadelphia
Shell Chem. Corp., 50 W. 50th St., N. Y.
Stauffer Chem. Co., 380 Madison Ave., N. Y.
Union Carbide Chems. Co., 270 Park Ave., N. Y.

"GENETRON," (Fluorinated Hydrocarbon Propellants)

Allied Chem. Corp., General Chemical Div., 40 Rector St., N. Y.

GERANIOL (see Aromatic Chemicals)

GERANIUM OIL (see Essential Oils)

GERANYL ACETATE (see Aromatic Chemicals)

GERMICIDAL DETERGENTS (see Detergents Synthetic, Cationic)

GERMICIDES (for Soap, Etc.)

Alco Oil & Chem. Corp., Trenton Ave. and William St., Phila.
Allied Chem. Corp., Plastics Div., 40 Rector St., N. Y.
American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
Antara Chemicals, 435 Hudson St., N. Y.
Armour Industrial Chem. Co., 110 N. Wacker Dr., Chicago
Barlow Chem. Corp., Ossining, N. Y.
Bex Sales Div., 115 W. 27 St., N. Y.
Ciba Co., Fair Lawn, N. J.
Dow Chem. Co., Midland, Mich.
Fine Organics, Inc., 205 Main St., Lodi, N. J.
Fleetwood Prods. Co., 509 5th Ave., N. Y.
Geigy Industrial Chemicals, Ardsley, N. Y.
Heyden Chem. Div., Heyden-Newport Chem. Corp., 324 Madison Ave., N. Y.
Intex Chem. Corp., 167 Main St., Lodi, N. J.
Metal & Thermit Corp., Rahway, N. J.
Monsanto Chemical Co., St. Louis
Onyx Chemical Corp., Warren & Morris Sts., Jersey City 2, N. J.
Ottawa Chem. Co., 750 N. Wheeling St., Toledo, O.
Rohm & Haas Co., 222 W. Washington Square, Phila. 5
Sindar Corp., 321 W. 44th St., N. Y.
Stecker Chems., Inc., 45 N. Broad St., Ridgewood, N. J.
Sterwin Chemicals, Inc., 1450 Broadway, N. Y. 18
Tanatex Chem. Corp., Belleville Turnpike, Kearny, N. J.
R. T. Vanderbilt Co., 230 Park Ave., N. Y. 17
Wilson-Martin Div., Snyder Ave. & Swanson St., Phila.
Witco Chem. Co., 122 E. 42nd St., N. Y. 17

GLASS BOTTLES and JARS (see Bottles)

GLASS AND WINDSHIELD CLEANERS

ABC Compounding Co., Oakcliffe & Harwell Rds., Atlanta, Ga.
Averil, Inc., 6780 NW 37 Ct., Miami, Fla.
B & W Chem. Co., 25920 Belle Porte Ave., Harbor City, Calif.
Baird & McGuire, Inc., Holbrook, Mass.
Barton Chemical Co., 1230 W. 46 St., Chicago 9
Cary Mfg. Co., 3559 Sweetwater Rd., Lemon Grove, Calif.
Chemical Service of Baltimore, Howard & West Sts., Balto. 30
Colgate-Palmolive Co., 300 Park Ave., N. Y. 22
Davies-Young Soap Co., Dayton 1, O.
Dettelbach Chem. Corp., 4111 Peachtree Rd., Atlanta, 19
Emulso Corp., 301 Ellicott St., Buffalo, N. Y.
Essential Chems. Co., 5906 N. Port Washington Rd., Milwaukee
Fitzpatrick Bros., 1300 W. 32 Pl., Chicago 8
Freesmeier Laboratories, 3661 Windsor Pl., St. Louis 13
Frontier Chem. Prods., 119 E. Soper St., St. Louis
Fluid Chem. Co., 878 Mt. Prospect Ave., Newark, N. J.
Fuld Bros., 702 S. Wolfe St., Baltimore
Golden Star Polish Mfg. Co., 400 E. 10th St., N. Kansas City, Mo.
Haag Laboratories, 140th St. & Seeley Ave., Blue Island, Ill.
Help Inc., 122 W. Kinzie St., Chicago
R. M. Hollingshead Corp., Camden, N. J.
Hysan Prods. Co., 930 W. 38th Pl., Chicago
Klix Chem. Co., 551 Railroad Ave., S. San Francisco
Jones-Hamilton Co., 455 Wells Ave., Newark, Calif.
M. Michel & Co., 90 Broad St., N. Y.
Midland Labs., Dubuque, Ia.
Pace, Inc., Box 206, Wilmington 99, Del.
Pennsalt Chems. Corp., 3 Penn Center, Phila.
Peterson Filling & Packaging Co., Hegeler Lane, Danville, Ill.
Purex Corp., Box 9686, Philadelphia, Pa.
Puro Co., 2801 Locust St., St. Louis 3
Southern Chemical Prods. Co., 170 Poplar St., Macon, Ga.
John T. Stanley Co., 642 W. 30th St., N. Y.
Tex-ite Prods. Corp., 859 E. 43 St., Bklyn. 10
Thompson-Hayward Chem. Co., 2915 SW Blvd., Kansas City 8, Mo.
Trio Chemical Wks., 341 Scholes St., Brooklyn 6
Uncle Sam Chemical Co., 575 W. 131st St., New York
U. S. Sanitary Spec. Corp., 1001 S. California Ave., Chicago 12
James Varley & Sons, 1200 Switzer Ave., St. Louis

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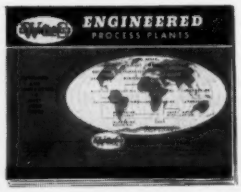

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R. W. Greeff & Co., 10 Rockefeller Plaza, N. Y. 20
Chas. Pfizer & Co., 630 Flushing Ave., Bklyn. 6
Stauffer Chem. Co., 380 Madison Ave., N. Y.

GLYCERINE (Refined)

Acme-Hardesty Co., 60 E. 42nd St., N. Y. C.
Archer-Daniels-Midland Co., Minneapolis
Armour Industrial Chem. Co., 110 N. Wacker Dr., Chicago
Colgate-Palmolive Co., 300 Park Ave., N. Y.
Dow Chem. Co., Midland, Mich.
Emery Industries, Carew Tower, Cincinnati
A. Gross & Co., 295 Madison Ave., N. Y.
Harchem Div., Box 178, Newark, N. J.
Lever Bros. Co., 390 Park Ave., N. Y.
Los Angeles Soap Co., Los Angeles, Calif.
Procter & Gamble Distributing Co., Cincinnati
Purex Corp., 9300 Rayo Ave., South Gate, Calif.
Reichhold Chemicals, Inc., White Plains, N. Y.
Robeco Chemicals, Inc., 25 E. 26 St., N. Y. 10
Shell Chemical Corp., 50 W. 50th St., N. Y. 18
Swift & Co., Hammond, Ind.
Vegetable Oil Prods., 5568 E. 61 St., Los Angeles

GLYCERINE PLANTS AND EQUIPMENT

G. Mazzoni, Busto Arsizio, Italy
Swenson Evaporator Co., Harvey, Ill.
Wurster & Sanger, 5201 S. Kenwood Ave., Chicago

GLYCERYL MONOSTEARATE, Oleate, Etc.

Atlas Powder Co., Wilmington 99, Dela.
Baker Castor Oil Co., 40 Ave. A, Bayonne, N. J.
Carlisle Chem. Wks., Reading, O.
Colgate-Palmolive Co., 300 Park Ave., N. Y. 22
E. F. Drew & Co., 15 E. 26 St., N. Y. 10
Foremost Food & Chem. Co., Oakland, Calif.
Emery Industries, Inc., Carew Tower, Cincinnati
Glyco Chemicals Div., 417 5th Ave., N. Y.
R. W. Greeff & Co., 10 Rockefeller Plaza, N. Y. 20
Harchem Div., 29 Main St., Belleville, N. J.
Hodag Chem. Corp., 7247 N. Central Park Ave., Chicago 45
Kessler Chem. Co., State Rd., Phila. 35
Knapp Prods., Inc., Lodi, N. J.
Marchon Prods. Ltd., Whitehaven, Cumberland, Eng.
M. Michel & Co., 90 Broad St., N. Y. 4
Nopco Chemical Co., 60 Park Pl., Newark 1, N. J.
Northwestern Chem. Co., 120 N. Aurora, W. Chicago
Process Chems. Co., 8733 S. Dice Rd., Santa Fe Springs, Calif.
Sole Chem. Corp., 7740 S. Chicago Ave., Chicago
Stepan Chem. Co., 427 W. Randolph St., Chicago
Swift & Co., Hammond, Ind.
Textilana Corp., 12607 Cerise Ave., Hawthorne, Calif.
Van Dyk & Co., Belleville, N. J.
Wilson-Martin Div., Snyder & Swanson, Phila.
Witco Chem. Co., 122 E. 42nd St., N. Y. 17

GLYCOL ETHER SOLVENTS (see Solvents, Glycol Ether)

GLYCOLS

Air Reduction Chem. & Charbide Co., 150 E. 42nd St., N. Y.
Allied Chem. Corp., Nitrogen Div., 40 Rector St., N. Y.
Amsco Solvents & Chemicals Co., 4619 Reading Rd., Cincinnati
Antara Chemicals, 435 Hudson St., N. Y.
Buffalo Solvents & Chemicals Corp., Box 73, Station B, Buffalo, N. Y.
Central Sols. & Chems. Co., 2540 W. Flournoy St., Chicago
Dixie Solvents & Chems. Co., Dixie Highway at Appleton, Louisville, Ky.
Dow Chemical Co., Midland, Mich.
Eastman Chem. Prods., Kingsport, Tenn.
General Aniline & Film Corp., 435 Hudson St., N. Y. 14
Glyco Products Div., 417 5th Ave., N. Y.
Hoosier Solvents & Chemicals Corp., 1650 Luett Ave., Indianapolis, Ind.
Jefferson Chemical Co., 1121 Walker Ave., Houston, Tex.
Missouri Solvents & Chemicals Co., 410 De Soto Ave., St. Louis
Ohio Solvents & Chemicals Co., 3470 W. 140th St., Cleveland
Olin Mathieson Chem. Corp., Org. Chems., 745 5th Ave., N. Y.
Robeco Chemicals, Inc., 25 E. 26 St., N. Y. 10
Shell Chemical Corp., 50 W. 50th St., N. Y.
Southern Solv. & Chem. Co., 917 Jefferson Highway, New Orleans
Texas Solvents & Chemicals Co., 8501 Market St., Houston, Tex.
Toledo Sols. & Chems. Co., 4051 South Ave., Toledo, O.

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Van Dyk & Co., 11 Williams St., Belleville, N. J.
Western Solvents & Chemicals Co., 6472 Selkirk Ave., Detroit
Wisconsin Solvents & Chemicals Corp., 1719 S. 83rd St., Milwaukee
Wolverine Solv. & Chem. Co., 2940 Stafford Ave., S.W., Grand Rapids
Wyandotte Chemicals Corp., Mich. Alkali Div., Wyandotte, Mich.

GLYCOL SPRAYS (Aerosol type for use as deodorizers and sanitizers, ready packaged)

Baird & McGuire, Inc., Holbrook, Mass.
Capitol Packaging Co., 1501 N. 31st Ave., Melrose Park, Ill.
Chase Products Co., 20 St. & Gardner Rd., Broadview, Ill.
Chemical Service of Balto., Howard & West Sts., Balto.
Colgate-Palmolive Co., 300 Park Ave., N. Y. 22
Continental Filling Corp., 123 N. Hazel St., Danville, Ill.
Fuld Bros., 702 S. Wolfe St., Baltimore
Hysan Prods. Co., 930 W. 38th Pl., Chicago
Klix Chem. Co., 551 Railroad Ave., S. San Francisco
Orb Industries, Wallingford Rd., Media, Pa.
Pace, Inc., Box 206, Wilmington 99, Del.
Peterson Filling & Packaging Co., Hegeler Lane, Danville, Ill.
Puro Co., 2801 Locust St., St. Louis 3
Sprayway, Inc., 7638 Vincennes Ave., Chicago 20
James Varley & Sons, 1200 Switzer Ave., St. Louis

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American Lignite Prods. Co., Ione, Calif.
Atlantic Refining Co., 260 S. Broad St., Phila.
Chemical Service Co. of Baltimore, Howard & West Sts., Balto.
Chas. B. Chrystal Co., 53 Park Pl., N. Y. 7
Dri-Rite Co., 100 W. Chicago Ave., Chicago 10
C. P. Hall Co., 414 S. Broadway, Akron
R. M. Hollingshead Corp., Camden, N. J.
Johns-Manville Prods. Corp., 22 E. 40th St., N. Y.
Klix Chem. Co., 551 Railroad Ave., S. San Francisco
Frank Miller & Sons, 2250 W. 58th St., Chicago
Minerals & Chemicals Philipp Corp., Menlo Park, N. J.
Oil-Dri Corp., 520 N. Mich. Ave., Chicago, Ill.
S. & S. Soap Co., 815 E. 135 St., N. Y. 54
Tamms Industries, Inc., 228 N. LaSalle St., Chicago
Uncle Sam Chemical Co., 573 W. 131st St., New York
Waverly Petroleum Prods. Co., 3018 Market St., Philadelphia
Wyandotte Chemicals Corp., J. B. Ford Div., Wyandotte, Mich.

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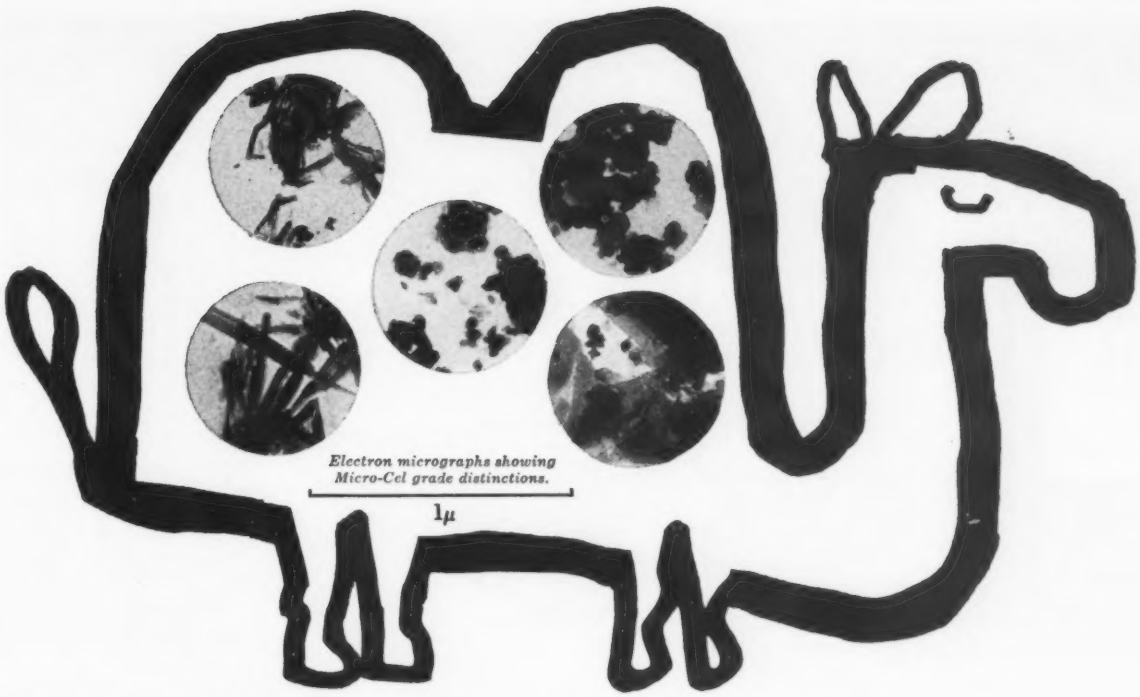
American Pulverizing Co., 18th & Austin Sts., St. Louis
J. H. Day Co., Cincinnati 12
First Machy. Corp., 209 10 St., Bklyn. 15 (Used)
Gruendler Patent Crusher & Pulverizer Co., 900 N. First St., St. Louis
B. F. Gump Co., 1338 S. Cicero Ave., Chicago
Houchin Division, 300 Straight St., Paterson, N. J.
Kent Machine Works, 39 Gold St., Brooklyn
J. M. Lehmann Co., 566 New York Ave., Lyndhurst, N. J.
G. Mazzoni, Busto Arsizio, Italy
Meccaniche Moderne, Corso Sempione 51, Busto Arsizio, Italy
Newman Tallow & Soap Machinery Co., 3601 S. Iron St., Chicago
Pulverizing Machinery Div., Chatham Rd., Summit, N. J.
Rapids Machinery Co., Marion, Iowa
Raymond Pulverizing Div., 1314 N. Branch St., Chicago
Chas. Ross & Sons, 148 Classon Ave., Brooklyn
Henry Simon Ltd., Cheadle Heath, Stockport, England
Troy Div., Skinner Engine Co., Erie, Pa.
Sprout, Waldron & Co., Muncy, Pa.
F. J. Stokes Corp., 5500 Tabor Rd., Phila.
Strong-Scott Mfg. Co., 451 Taft St., N.E., Minneapolis, Minn.
Sturtevant Mill Co., Park & Clayton Sts., Boston
U. S. Stoneware Co., Akron, O.
Williams Patent Crusher & Pulverizer Co., 2700 N. 9th St., St. Louis
Young Machy. Co., Muncy, Pa.

GUMS (oil, spirit soluble; varnish gums) Copal, Congo, Manila, Dammar, etc.)

Wm. Diehl & Co., 114 E. 56th St., N. Y. C.
Gillespie-Rogers-Pyatt Co., 75 West St., N. Y. 16
O. G. Innes Corp., 10 E. 40th St., N. Y. 16
Meer Corp., 318 W. 46th St., N. Y. 36
Pan American Resin & Chem. Co., 17 Academy St., Newark, N. J.
Reichhold Chems., Inc., White Plains, N. Y.
Thurston & Braidich, 286 Spring St., N. Y. 13
Robeco Chemicals, Inc., 25 E. 26 St., N. Y. 10



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Velsicol Chem. Corp., 330 E. Grand Ave., Chicago

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Alco Oil & Chem. Corp., Trenton Ave. & Williams St., Phila.
Dodwell & Co., 120 Wall St., N. Y. 5
Paul A. Dunkel & Co., 26 Journal Sq., Jersey City, N. J.
B. F. Goodrich Chem. Co., 3135 Euclid Ave., Cleveland 15
Hercules Powder Co., Wilmington
Meer Corp., 318 W. 46th St., N. Y. 36
National Starch & Chem. Corp., 750 3rd Ave., N. Y. 17
Neumann-Buslee & Wolfe, 5800 Northwest Hgwy., Chicago
Nopco Chem. Co., 60 Park Pl., Newark, N. J.
Orbis Products Corp., 601 W. 26th St., N. Y. 1
F. H. Paul & Stein Bros., Inc., 235 Fifth Ave., N. Y.
S. B. Penick & Co., 100 Church St., N. Y. 8
Prentiss Drug & Chem. Co., 101 W. 31st St., N. Y. 1
Robeco Chemicals, Inc., 25 E. 26 St., N. Y. 10
Seaplant Chem. Corp., 63 David St., New Bedford, Mass.
Thompson-Hayward Chems. Co., 2915 SW Blvd., Kansas City 8
Thurston & Braidich, 286 Spring St., N. Y. 13

GYM-FINISH FLOOR SEAL (see Floor Sealers)

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ABC Compounding Co., Oakcliffe & Harwell Rds., Atlanta, Ga.
Averil, Inc., 6780 NW 37 Ct., Miami, Fla.
Capitol Soap Corp., 310 Colfax Ave., Clifton, N. J.
Chemical Concentrates, Ft. Washington, Pa.
Chicago Sanitary Prod. Co., 3100 S. Throop St., Chicago 8
Concord Chem. Co., 205 S. 2 St., Camden, N. J.
Continental Chem. Co., 195 21 Ave., Paterson, N. J.
Dameron Enterprises, 427 S. 20th St., Louisville, Ky.
Davies-Young Soap Co., Dayton 1, O.
Dettelbach Chem. Corp., 4111 Peachtree Rd., Atlanta 19
DL Products, Inc., 51 E. Market St., Buffalo 4, N. Y.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Essential Chems. Co., 5906 N. Port Washington Ave., Milwaukee
Fine Organics, Inc., 205 Main St., Lodi, N. J.
Finetex, Inc., 418 Falmouth Ave., East Paterson, N. J.
Frontier Chem. Prods. Co., 119 E. Soper St., St. Louis 11
Fuld Bros., 702 S. Wolfe St., Baltimore 3
Gojer, Inc., Box 991, Akron, O.
Haag Laboratories, 14000 Seeley Ave., Blue Island, Ill.
Hammons Prods. Inc., 1141 Wildwood Ave., Ft. Wayne, Ind.
Harley Soap Co., Pearce & Orthodox Sts., Phila. 37
Help Inc., 122 W. Kinzie St., Chicago
Highland Laboratories, Kearny, N. J.
R. M. Hollingshead Corp., Camden, N. J.
Hysan Prods. Co., 930 W. 38th Pl., Chicago
Independence Chem. Co., N. Railroad & Essex, Gloucester City, N. J.
Kaysing Corp., 8005 Alabama, St. Louis 11
Klix Chem. Co., 551 Railroad Ave., S. San Francisco
Kutol Products Co., 2817 Highland Ave., Cincinnati
Lightfoot Co., 380 Madison Ave., N. Y. C.
McAleer Mfg. Corp., 101 S. Waterman Ave., Detroit 17
Mione Manufacturing Co., Collingdale, Pa.
New Jersey Chem. Co., 56 Park Ave., Lyndhurst, N. J.
Old Empire, Inc., Mt. Prospect & Verona, Newark, N. J.
Onyx Chemical Corp., Warren & Morris Sts., Jersey City, N. J.
G. H. Packwood Mfg. Co., 1545 Tower Grove Ave., St. Louis 10
Peck's Products Co., 610 E. Clarence Ave., St. Louis 15
Quickee Prods., Inc., Box 312, Yonkers, N. Y.
Regal Chem. Corp., 115 Dobbin St., Bklyn. 22
S & E Chem. Co., 1751 N. Harding Ave., Chicago
Sanders Chem. Co., 2205 N. American St., Phila. 33
Southern Chemical Prods. Co., 170 Poplar St., Macon, Ga.
John T. Stanley Co., 642 W. 30th St., N. Y.
Sugar Beet Prods. Co., Saginaw, Mich.
Surety Laboratories, 3946 Olive St., St. Louis 8
Tex-ite Prods. Corp., 859 E. 43 St., Bklyn. 10
Treplow Chem. Co., 100 New St., Paterson, N. J.
Trio Chemical Wks., 341 Scholes St., Brooklyn 6
U. S. Borax & Chem. Corp., 50 Rockefeller Plaza, N. Y.
Utility Co., 636 W. 44th St., N. Y. 26

HAND CREAMS, (Protective)

Averil, Inc., 6780 NW 37 Ct., Miami, Fla.
G. Barr & Co., 3601 S. Racine Ave., Chicago
Davies Young Soap Co., Dayton, O.
DL Products, Inc., 51 E. Market St., Buffalo 4, N. Y.
Frontier Chem. Prods., Inc., 119 E. Soper St., St. Louis
Hammons Prods., Inc., 1141 W. Wildwood Ave., Ft. Wayne, Ind.
Help Inc., 122 W. Kinzie St., Chicago
R. M. Hollingshead Corp., Camden, N. J.
Hysan Prods. Co., 930 W. 38th Pl., Chicago
Kaysing Corp., 8005 Alabama, St. Louis 11
Kutol Prods. Co., 2817 Highland Ave., Cincinnati
McAleer Mfg. Corp., 101 S. Waterman Ave., Detroit 17
Old Empire, Inc., Mt. Prospect & Verona, Newark, N. J.
Quickee Prods., Inc., 141 Woodworth Ave., Yonkers, N. Y.
S & E Chem. Co., 1751 N. Harding Ave., Chicago
Sonneborn Chem. & Refining Corp., 300 Park Ave. S., N. Y.
John T. Stanley Co., 642 W. 30 St., N. Y.
Surety Laboratories, 3946 Olive St., St. Louis
Tex-ite Prods. Corp., 859 E. 43 St., Bklyn. 10
Trio Chemical Wks., 341 Scholes St., Bklyn. 6
Utility Co., 636 W. 44th St., N. Y. 36

HAND SOAP (see Soap, Hand)

HEPTACHLOR (Technical)

Velsicol Chemical Corp., 330 E. Grand Ave., Chicago

HEPTACHLOR FORMULATIONS

Baird & McGuire, Inc., Holbrook, Mass.
California Spray-Chemical Corp., Richmond, Calif.
Diamond Alkali Co., Union Commerce Bldg., Cleveland
Douglas Chem. Co., 620 E. 16th Ave., North Kan. City, Mo.
Geigy Agricultural Chemicals, Ardsley, N. Y.
Food Machy. & Chem. Corp., 441 Lexington Ave., N. Y.
McLaughlin, Gormley, King Co., 1715 5th St., S.E., Minneapolis
Morton Chem. Co., 110 N. Wacker Dr., Chicago 6
S. B. Penick & Co., 100 Church St., N. Y. 8
Prentiss Drug & Chem. Co., 101 W. 31st St., N. Y. 1
Private Brands, Inc., 300 S. 3 St., Kansas City, Kan.
Residex Corp., Clark, N. J.
Stauffer Chem. Co., 380 Madison Ave., N. Y.
United-Heckathorn, 600 S. 4 St., Richmond, Calif.
Velsicol Chemical Corp., 330 E. Grand Ave., Chicago

HEXACHLOROPHENE

Sindar Corp., 321 W. 44th St., N. Y. 18

HEXAETHYL TETRAPHOSPHATE

American Potash & Chem. Co., 3060 W. 6th St., Los Angeles
California Spray-Chemical Corp., Richmond, Calif.
Eastman Chemical Products, Inc., Kingsport, Tenn.
Geigy Agricultural Chemicals, Ardsley, N. Y.
Monsanto Chemical Co., St. Louis, Mo.
Prentiss Drug & Chem. Co., 101 W. 31st St., N. Y.
Victor Chemical Works, 155 N. Wacker Dr., Chicago

HOMOGENIZERS (Dispersion Equipment) (See also Colloid Mills)

Abbe Engineering Co., Little Falls, N. J.
Gifford Wood Co., 420 Lexington Ave., N. Y.
Girdler Process Equipment Div., Louisville, Ky.
Manton Gaulin Mfg. Co., Everett, Mass.
G. Mazzoni, Busto Arsizio, Italy
Morehouse-Cowles, Inc., 1150 San Francisco Rd., Los Angeles
National Instrument Co., 4119 Fordleigh Rd., Baltimore
Newman Tallow & Soap Machy. Co., 3601 S. Iron St., Chicago (Used)
Premier Mill Corp., 224 Fifth Ave., N. Y. C. 1
Read Standard Corp., York, Pa.
Chas. Ross & Son Co., 148-156 Classon Ave., Bklyn.
Henry Simon Ltd., Cheadle Heath, Stockport, England
U. S. Stoneware Co., Akron, O.
Wurster & Sanger, 5201 S. Kenwood Ave., Chicago

HOSPITAL SOAPS (see Soap, Potash)

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ABC Compounding Co., Oakcliffe & Harwell Rds., Atlanta, Ga.
A-M-R Chem. Co., 985 E. 35th St., Brooklyn 10
Barton Chem. Co., 1230 W. 46 St., Chicago
Dettelbach Chem. Corp., 4111 Peachtree Rd., Atlanta 19
Fluid Chem. Co., 878 Mt. Prospect Ave., Newark, N. J.

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James Good, Inc., 2107 Susquehanna Ave., Phila. 25
R. M. Hollingshead Corp., Camden, N. J.
Hysan Prods. Co., 930 W. 38th Pl., Chicago
National Research & Chem. Co., 12520 Cerise Ave., Hawthorne, Calif.
J. L. Prescott Co., 27 8th St., Passaic, N. Y.
Southern Chemical Prods. Co., 170 Poplar St., Macon, Ga.
John T. Stanley Co., 642 W. 30th St., N. Y.
Thompson-Hayward Chem. Co., 2915 SW Blvd., Kansas City 8
Trio Chemical Wks., 341 Scholes St., Bklyn. 6
Washine Chem. Corp., Lodi, N. J.

HYDRAZINE and SALTS

Fine Organics, Inc., 205 Main St., Lodi, N. J.
Food Machy. & Chem. Corp., 161 E. 42 St., N. Y. 17
Merck & Co., Rahway, N. J.
Olin Mathieson Chem. Corp., Ind. Chems., Baltimore 3

HYDROGEN PEROXIDE

Allied Chem. Corp., Solvay Process Div., 61 Broadway, N. Y.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Food Machy. & Chem. Corp., 161 E. 42 St., N. Y.
Hercules Powder Co., Wilmington, Del.
Mallinckrodt Chem. Wks., St. Louis 7
Pennsalt Chems. Corp., 3 Penn Center Plaza, Phila.
Pittsburgh Plate Glass Co., 1 Gateway Center, Pittsburgh
Shell Chem. Corp., 50 W. 50 St., N. Y. 20

HYDROGENATED OILS

Amato Agency, Inc., 11 Broadway, N. Y. 4
Archer-Daniels-Midland Co., Minneapolis, Minn.
Armour Industrial Chem. Co., 110 N. Wacker Dr., Chicago
Baker Castor Oil Co., 40 Ave. A, Bayonne, N. J.
E. F. Drew & Co., 15 E. 26 St., N. Y. 10
Eastern Industries, Ridgefield, N. J.
Emery Industries, Carew Tower, Cincinnati, O.
Harchem Div., 25 Main St., Belleville 9, N. J.
Lever Bros. Co., 390 Park Ave., N. Y. 22
M. Michel & Co., 90 Broad St., N. Y. 4
Procter & Gamble Dist. Co., Cincinnati
Swift & Co., Hammond, Ind.
Vegetable Oil Prods., 5568 E. 61 St., Los Angeles
Woburn Chem. Corp., 1200 Harrison Ave., Kearny, N. J.

HYDROGENATION PLANTS (see Oil Hydrogenation Plants)

HYDROXYETHYL CELLULOSE

Dow Chem. Co., Midland, Mich.
Hercules Powder Co., Wilmington, Dela.
Union Carbide Chems. Co., 270 Park Ave., N. Y.

HYDROSULFITES (Soap Bleaches)

Dow Chemical Co., Midland, Mich.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Monsanto Chemical Co., St. Louis, Mo.
Rohm & Haas Co., Inc., 222 W. Washington Sq., Phila.
Tennessee Corp., 617 Grant Bldg., Atlanta, Ga.
Jos. Turner & Co., Ridgefield, N. J.

HYPOCHLORITES (see Chlorine; Laundry Bleach)

INSECT POWDER GUNS (see Dusters for Insecticide Powder)

INSECT REPELLENTS

Baird & McGuire, Inc., Holbrook, Mass.
California Spray-Chemical Corp., Richmond, Calif.
Cowles Chem. Co., 7016 Euclid Ave., Cleveland 74
Dow Chemical Co., Midland, Mich.
Glenn Chem. Co., 2735 N. Ashland Ave., Chicago
R. W. Greeff & Co., 10 Rockefeller Plaza, N. Y. 10
Hercules Powder Co., Wilmington
McLaughlin, Gormley, King Co., 1715 5th St., S.E., Minneapolis
Michigan Chem. Corp., St. Louis, Mich.
Monsanto Chemical Co., St. Louis
Morton Chem. Co., 110 N. Wacker Dr., Chicago 6
S. B. Penick & Co., 100 Church St., N. Y.

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Tex-ite Prods. Corp., 859 E. 43 St., Brooklyn
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Union Carbide Chems. Co., 270 Park Ave., N. Y.
Van Dyk & Co., Belleville, N. J.

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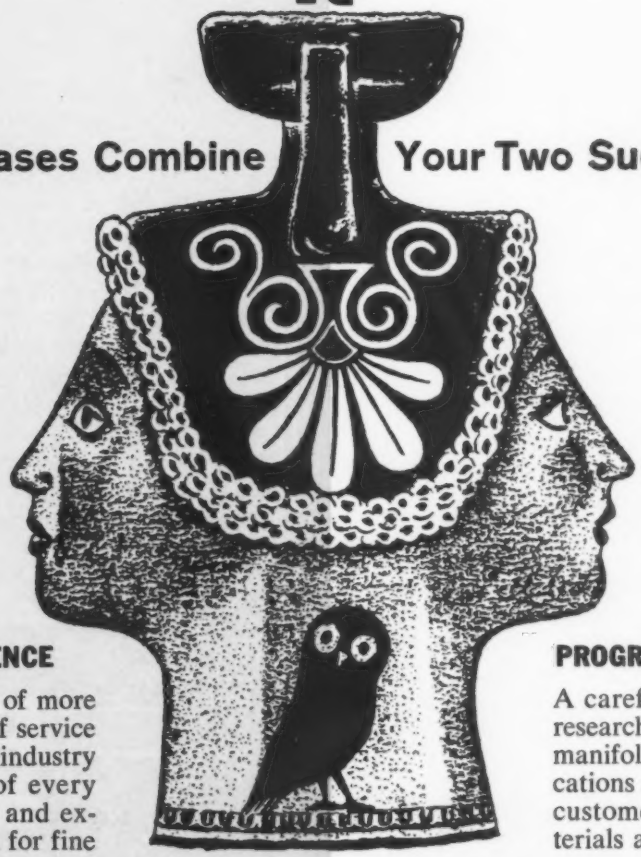

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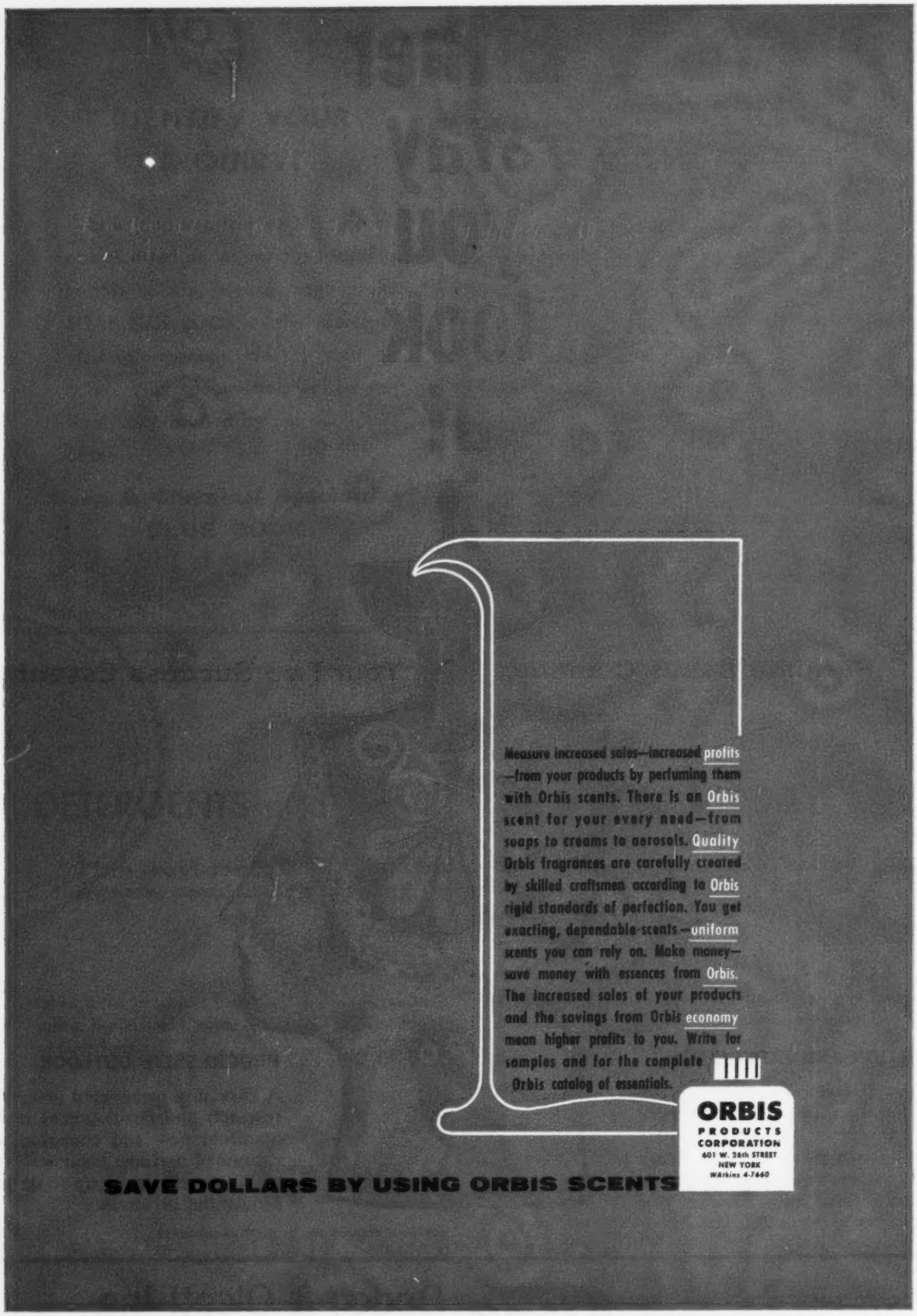
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Food Machy. & Chem. Corp., 441 Lexington Ave., N. Y.
Fuld Bros., 702 S. Wolfe St., Baltimore
Geigy Agri. Chems., Ardsley, N. Y.
Hub States Chem. & Equip. Co., 1255 N. Windsor St., Indianapolis
Hysan Prods. Co., 930 W. 38th Pl., Chicago
McLaughlin, Gormley, King Co., 1715 5th St., S.E., Minneapolis
S. B. Penick & Co., 100 Church St., N. Y. 8
Prentiss Drug & Chem. Co., 101 W. 31st St., N. Y. 1
Private Brands, Inc., 300 S. 3 St., Kansas City, Kan.
Residex Corp., Clark, N. J.
Stauffer Chem. Co., 380 Madison Ave., N. Y.
United-Heckathorn, 600 S. 4 St., Richmond, Calif.
Warsaw Chem. Co., Warsaw, Ind.

METHYL ANTHRANILATE (see also Aromatic Chemicals)

Aromatic Prods., 235 4th Ave., N. Y. 3
Dodge & Olcott, Inc., 75 9th Ave., N. Y.
Dow Chemical Co., Midland, Mich.
Felton Chemical Co., 603 Johnson Ave., Brooklyn, N. Y.
Florasynth Labs., 900 Van Nest Ave., N. Y.
Fritzsche Bros., 76 9th Ave., N. Y. 11
Givaudan-Delawanna, Inc., 321 W. 44th St., N. Y.
Magnus, Mabee & Reynard, 16 Desbrosses St., N. Y. 13
Norda Essential Oil & Chem. Co., 601 W. 26th St., N. Y.
Orbis Products Corp., 601 W. 26 St., N. Y.
Polak's Frutal Works, 33 Sprague Ave., Middletown, N. Y.
Robeco Chemicals, Inc., 25 E. 26th St., N. Y. 10
Schimmel & Co., Newburgh, N. Y.
Shulton, Inc., 630 5th Ave., N. Y. C.
Ungerer & Co., 161 Ave. of Americas, N. Y. 13
Albert Verley & Co., 1375 E. Linden Ave., Linden, N. J.
Verona Aromatics, 26 Verona Ave., Newark 4, N. J.

METHYL BROMIDE

Amer. Potash & Chem. Corp., 3030 W. 6th St., Los Angeles
Dow Chemical Co., Midland, Mich.
Kolker Chem. Co., St. Louis, Mich.

METHYL CELLULOSE

Antara Chemicals, 435 Hudson St., N. Y. 14
Dow Chem. Co., Midland, Mich.
Hercules Powder Co., 961 Market St., Wilmington, Del.

METHYL CHLORIDE

Allied Chem. Corp., Solvay Process Div., 61 Broadway, N. Y.
American Potash & Chem. Corp., 3030 W. 6th St., Los Angeles 54
Diamond Alkali Co., Union Commerce Bldg., Cleveland.
Dow Chemical Co., Midland, Mich.
E. I. du Pont de Nemours & Co., Wilmington
Kolker Chem. Co., 600 Doremus Ave., Newark 5, N. J.
Virginia Smelting Co., W. Norfolk, Va.

METHYL ETHYL KETONE

Amsco Sols. & Chems. Co., 4619 Reading Road, Cincinnati
Buffalo Sols. & Chems. Corp., Buffalo 7, N. Y.
Celanese Corp. of America, 180 Madison Ave., N. Y. 16

METHYL ETHYL KETONE (Cont'd.)

Dixie Sols. & Chems. Co., Dixie Hgwy., Louisville
Enjay Chem. Co., 15 W. 51 St., N. Y. 9
Hoosier Sols. & Chems. Corp., 1650 Luett Ave., Indianapolis
Missouri Sols. & Chems. Co., 419 De Soto Ave., St. Louis 7
Ohio Sols. & Chems. Co., 3470 W. 140 St., Cleveland
Robeco Chemicals, Inc., 25 E. 26 St., N. Y. 10
Shell Chem. Corp., 50 W. 50 St., N. Y.
Southern Sols. & Chem. Corp., 917 Jefferson Hgwy., New Orleans
Texas Sols. & Chems. Co., 8501 Market St., Houston
Toledo Sols. & Chems. Co., 4051 South Ave., Toledo, O.
Union Carbide Chems. Co., 270 Park Ave., N. Y.
Western Sols. & Chems. Co., 6472 Selkirk Ave., Detroit
Wisconsin Sols. & Chems. Corp., 1719 S. 83 St., Milwaukee
Wolverine Sols. & Chems. Co., 2940 Stafford Ave., Grand Rapids

METHYL SALICYLATE (Artificial Wintergreen) (see also Aromatic Chemicals)

Aromatic Products, Inc., 235 4th Ave., N. Y. 3
Dodge & Olcott, Inc., 75 9th Ave., N. Y.
Dow Chemical Co., Midland, Mich.
Felton Chemical Co., 603 Johnson Ave., Brooklyn, N. Y.
Florasynth Laboratories, 900 Van Nest Ave., N. Y.
Fritzsche Bros., Inc., 76 Ninth Ave., N. Y.
Givaudan-Delawanna, Inc., 321 W. 44th St., N. Y.
Heyden Chem. Div., Heyden Newport Chem. Corp., 342 Madison Ave., N. Y.
Magnus, Mabee & Reynard, 16 Desbrosses St., N. Y. 13
Merck & Co., Rahway, N. J.
Monsanto Chemical Co., St. Louis, Mo.
Neumann, Buslee & Wolfe, Inc., 5800 Northwest Highway, Chicago
Norda Essential Oil & Chem. Co., 601 W. 26th St., N. Y.
Orbis Products Corp., 601 W. 26th St., N. Y.
S. B. Penick & Co., 100 Church St., N. Y. 8
Robeco Chemicals, Inc., 25 E. 26th St., N. Y. 10
Schimmel & Co., Newburgh, N. Y.
Shulton, Inc., 630 5 Ave., N. Y.
Ungerer & Co., 161 Ave. of Americas, N. Y. 13
Verona Aromatics, 26 Verona Ave., Newark 4, N. J.
R. D. Webb & Co., 137 Boston Post Rd., Cos Cob, Conn.

METHYLENE CHLORIDE

Allied Chem. Corp., Solvay Process Div., 61 Broadway, N. Y.
American Potash & Chem. Corp., 3030 W. 6th St., Los Angeles
Diamond Alkali Co., Union Commerce Bldg., Cleveland
Dow Chemical Co., Midland, Mich.
E. I. du Pont de Nemours & Co., Wilmington
Frontier Chem. Co., Wichita, Kan.
Kolker Chem. Corp., 600 Doremus Ave., Newark, N. J.
Stauffer Chem. Co., 380 Madison Ave., N. Y.

MICROCRYSTALLINE WAXES (see Waxes, Microcrystalline)

MILDEW PREVENTIVES

American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
Antara Chemicals, 435 Hudson St., N. Y. 14
Barlow Chem. Corp., Ossining, N. Y.
Carlisle Chem. Wks., Reading, O.
Click Chem. Corp., 601 Columbus Ave., Mount Vernon, N. Y.
Cuprinol Div., Simsbury, Conn.
Dow Chemical Co., Midland, Mich.
E. I. du Pont de Nemours & Co., Wilmington
Fine Organics, Inc., 205 Main St., Lodi, N. J.
Harshaw Chemical Co., 1945 E. 97th St., Cleveland
Heyden Chem. Div., Heyden Newport Chem. Corp., 342 Madison Ave., N. Y.
Hilton-Davis Chem. Co., 2235 Langdon Farm Rd., Cincinnati
Intex Chem. Corp., 167 Main St., Lodi, N. J.
Mallinckrodt Chemical Wks., St. Louis 7
Monsanto Chemical Co., St. Louis, Mo.
Olin Mathieson Chem. Corp., Ind. Chems., Baltimore 3
Puro Co., 2801 Locust St., St. Louis
Prior Chemical Corp., 420 Lexington Ave., N. Y.
W. T. Rawleigh Co., Freeport, Ill.
Refined Products Co., 624 Schuyler Ave., Lyndhurst, N. J.
Rohm & Haas Co., 222 W. Washington Square, Phila. 5
Sindar Corp., 321 W. 44th St., N. Y. 36
Stecker Chems., Inc., 45 N. Broad St., Ridgewood, N. J.
Joseph Turner & Co., Ridgefield, N. J.
R. T. Vanderbilt Co., 230 Park Ave., N. Y. 17
Witco Chem. Co., 122 E. 42nd St., N. Y. 17

MILLS, SOAP POWDER (see Soap Mills)

MINERAL OIL

Amoco Chems. Co., 130 E. Randolph Dr., Chicago
Atlantic Refining Co., 260 S. Broad St., Philadelphia
Continental Oil Co., 1270 Av. of Americas, N. Y. 20
Esso Standard Oil Co., 15 W. 51st St., N. Y. 19
Pennsylvania Refining Co., Butler, Pa.
Robeco Chemicals, Inc., 25 E. 26th St., N. Y. 10
Socony Mobil Oil Co., 150 E. 42nd St., N. Y. 17
Sonneborn Chem. & Refining Corp., 300 4th Ave., N. Y. 10
Standard Oil Co. (Calif.), 225 Bush St., San Francisco
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13

MINERAL SOAP (see Petrolatum)

MIRBANE OIL (Nitrobenzene) (see also Essential Oils)

Allied Chem. Corp., National Aniline Div., 40 Rector St., N. Y.
Dodge & Olcott, Inc., 75 9th Ave., N. Y.
E. I. du Pont de Nemours & Co., Wilmington
Felton Chem. Co., 603 Johnson Ave., Bklyn. 37
Fritzsche Bros., 76 9th Ave., N. Y. 11
Magnus, Mabee & Reynard, 16 Desbrosses St., N. Y. 13
Orbis Prods. Corp., 601 W. 26 St., N. Y.
Roubechez, Inc., 39 Roselle St., Mineola, N. Y.
Schimmel & Co., 601 W. 26th St., N. Y.
Ungerer & Co., 161 Ave. of Americas, N. Y. 13

MIXERS (Portable)

Alsop Engineering Corp., Milldale, Conn.
Conn. & Co., S. Marion St., Warren, Pa.
Craddock Equipment Co., 1507 A St., Wilmington, Del.
J. H. Day Co., 4930 Beech St., Cincinnati 12
Eastern Industries, Inc., Hamden 14, Conn.
Ertel Engineering Corp., West Front St., Kingston, N. Y.
First Machy. Corp., 209 10 St., Bklyn. 15 (Used)
Gifford-Wood Co., 420 Lexington Ave., N. Y.
Houchin Division, 300 Straight St., Paterson, N. J.
Mixing Equipment Co., Inc., 167 Mt. Read Blvd., Rochester, N. Y.
Morehouse-Cowles, Inc., 1150 San Fernando Rd., Los Angeles
National Equipment Co., 153 Crosby St., N. Y. 12
Newman Tallow & Soap Machy. Co., 3601 S. Iron St., Chicago (Used)
H. K. Porter Co., 49th & Harrison Sts., Pittsburgh
Chas. Ross & Son Co., 148-156 Classon Ave., Bklyn.
Strong-Scott Mfg. Co., 451 Taft St., NE, Minneapolis
Terris Div. Consolidated Siphon Supply Co., 22 Wooster St., N. Y.

MIXING MACHINERY (Change Can Mixers)

Arthur Colton Co., 3431 E. Lafayette, Detroit
Conn. & Co., 9 S Marion St., Warren, Pa.
J. H. Day Co., 4930 Beech St., Cincinnati 12
First Machy. Corp., 209 10 St., Bklyn. 15 (Used)
H. Hockmeyer & Co., 341 Coster St., N. Y.
Houchin Division, 300 Straight St., Paterson, N. J.
Kent Machine Works, 39 Gold St., Brooklyn
Newman Tallow & Soap Machy. Co., 3601 S. Iron St., Chicago (Used)
Chas Ross & Son Co., 148 Classon Ave., Brooklyn
Troy Div., Skinner Engine Co., Erie, Pa.

MIXING MACHINERY (General)

Alsop Engineering Corp., Milldale, Conn.
Brower Mfg. Co., 411 N. 3rd St., Quincy, Ill.
Arthur Colton Co., 3431 E. Lafayette, Detroit
Conn. & Co., 9 S. Marion St., Warren, Pa.
Craddock Equipment Co., 1507 A. St., Wilmington, Del.
J. H. Day Co., 4930 Beech St., Cincinnati 12
Eastern Industries, Inc., Hamden 14, Conn.
Ertel Engineering Corp., W. Front St., Kingston, N. Y.
First Machy. Corp., 209 10 St., Bklyn. 15 (Used)
Gifford-Wood Co., 420 Lexington Ave., N. Y. C.
Girdler Process Equipment Div., Louisville, Ky.
B. F. Gump Co., 1338 S. Cicero Ave., Chicago
Houchin Division, 300 Straight St., Paterson, N. J.
Industrial Process Engineers, 8 Lister Ave., Newark, N. J.
Kent Machine Works, 39 Gold St., Brooklyn
J. M. Lehmann Co., 566 New York Ave., Lyndhurst, N. J.
G. Mazzoni, Busto Arsizio, Italy
Meccaniche Moderne, Corso Sempione 51, Busto Arsizio, Italy
Mixing Equipment Co., 167 Mt. Read Blvd., Rochester, N. Y.
Munson Mill Machy. Co., 210 Seward Ave., Utica, N. Y.
Paterson-Kelley Co, East Stroudsburg, Pa.

MIXING MACHINERY (General) (Cont'd.)

Rapids Machy. Co., Marion, Ia.
Raymond Pulverizer Div., 1314 N. Branch St., Chicago
Chas. Ross & Son Co., 148-156 Classon Ave., Bklyn. 5
Scottdel, Inc., Swanton, Ohio
Henry Simon Ltd., Cheadle Heath, Stockport, England
Sprout, Waldron & Co., Muncy, Pa.
F. J. Stokes Corp., 5500 Tabor Rd., Phila.
Strong-Scott Mfg. Co., 451 Taft N.E., Minneapolis, Minn.
Sturtevant Mill Co., Dorchester, Boston 22, Mass.
Terris Div. Consolidated Siphon Supply Co., 22 Wooster St., N. Y.
U. S. Stoneware Co., Akron, O.
Young Machy. Co., Muncy, Pa.

MIXING MACHINERY (Dry Products)

Abbe Engineering Co., Little Falls, N. J.
Brower Mfg. Co., 411 N. 3rd St., Quincy, Ill.
Arthur Colton Co., 3431 E. Lafayette, Detroit
Conn. & Co., 9 S. Marion St., Warren, Pa.
J. H. Day Co., Cincinnati 12
First Machy. Corp., 209 10 St., Bklyn. 15 (Used)
Girdler Process Equipment Div., Louisville 1, Ky.
B. F. Gump Co., 1338 S. Cicero Ave., Chicago
Houchin Division, 300 Straight St., Paterson, N. J.
Industrial Process Engineers, 8 Lister Ave., Newark, N. J.
International Engineering, P. O. Box 973, Dayton 1, O.
J. H. Lehmann Co., 566 New York Ave., Lyndhurst, N. J.
Munson Mill Machy. Co., 210 Seward Ave., Utica, N. Y.
Newman Tallow & Soap Machy. Co., 3601 S. Iron St., Chicago (Used)
Paterson-Kelley Co., East Stroudsburg, Pa.
H. K. Porter Co., 49th & Harrison Sts., Pittsburgh
Rapids Machy. Co., Marion, Ia.
Robinson Mfg. Co., Muncy, Pa.
Scottdel, Inc., Swanton, Ohio
Henry Simon Ltd., Cheadle Heath, Stockport, England.
Sprout, Waldron & Co., Muncy, Pa.
F. J. Stokes Corp., 5500 Tabor Rd., Phila.
Strong-Scott Mfg. Co., 451 Taft N.E., Minneapolis, Minn.
Struthers-Wells Corp., Warren, Pa.
Sturtevant Mill Co., Park & Clayton Sts., Boston
U. S. Stoneware Co., Akron, O.
Young Machy Co., Muncy, Pa.

MONOCHLORBENZENE

Allied Chem. Corp., Solvay Process Div., 61 Broadway, N. Y.
Dow Chem. Co., Midland, Mich.
Hooker Chem. Corp., Niagara Falls, N. Y.
Monsanto Chem. Co., St. Louis, Mo.
Pittsburgh Plate Glass Co., 1 Gateway Center, Pittsburgh

MONOETHANOLAMINE (see listings under Ethanolamines)

MOSQUITO LARVACIDES

ABC Compounding Co., Oakcliff & Harwell Rds., Atlanta, Ga.
Baird & McGuire, Inc., Holbrook, Mass.
California Spray-Chemical Corp., Richmond, Calif.
Chem. Insecticide Corp., 30 Whitman Ave., Metuchen, N. J.
Chem. Service of Balto., Howard & West Sts., Balto.
Chicago Sanitary Prods. Co., 3100 S. Throop St., Chicago 8
Chipman Chemical Co., Bound Brook, N. J.
Dow Chemical Co., Midland, Mich.
E. I. du Pont de Nemours & Co., Wilmington
Geigy Agri. Chems., Ardsley, N. Y.
R. M. Hollingshead Corp., Camden, N. J.
Hub States Chems. & Equipment, 1255 N. Windsor St., Indianapolis
James Huggins & Son, 239 Medford St., Malden, Mass.
Industrial Materials Co., 1017 McCall St., Houston
Kemiko Mfg. Co., 500 Chancellor Ave., Irvington, N. J.
Michigan Chem. Corp., St. Louis, Mich.
Peck's Prods. Co., 610 E. Clarence Ave., St. Louis
S. B. Penick & Co., 100 Church St., N. Y. 8
Prentiss Drug & Chem. Co., 101 W. 31st St., N. Y.
Private Brands, Inc., 300 S. 3 St., Kansas City, Kan.
Rohm & Haas Co., 222 W. Washington Sq., Phila.
Thompson-Hayward Chem. Co., 2915 SW Blvd., Kansas City, Mo.
Uncle Sam Chemical Co., 573 W. 131st St., N. Y. C.
James Varley & Sons, 1200 Switzer Ave., St. Louis
Velsicol Chem. Corp., 330 E. Grand Ave., Chicago
York Chem. Co., 23 Dean St., Bklyn. 1

MOTH CAKES AND CRYSTALS (see Deodorizing Blocks)

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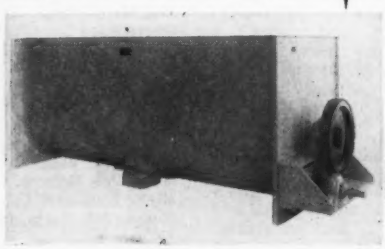

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Antara Chemicals, 435 Hudson St., N. Y. 14
Baird & McGuire, Inc., Holbrook, Mass.
Chem. Service of Balto., Howard & West Sts., Balto.
Click Chemical Corp., Columbus & Carleton Aves., Mt. Vernon, N. Y.
Continental Chem. Co., 195 21 Ave., Paterson, N. J.
Dow Chemical Co., Midland, Mich.
Fine Organics, Inc., 205 Main St., Lodi, N. J.
Fuld Bros., 702 S. Wolfe St., Baltimore
Geigy Agri. Chems., Ardsley, N. Y.
James Good Co., 2107 Susquehanna Ave., Philadelphia
R. H. Hollingshead Corp., Camden, N. J.
Hub States Chems. & Equipment, 1255 N. Windsor St., Indianapolis
Hysan Prods. Co., 930 W. 38th Pl., Chicago
Inter Chem. Corp., 157 Main St., Lodi, N. J.
Kaysing Corp., 8005 Alabama, St. Louis 11
Kemiko Mfg. Co., 500 Chancellor Ave., Irvington, N. J.
Merck & Co., Rahway, N. J.
Michigan Chem. Corp., St. Louis, Mich.
Onyx Chemical Corp., Warren & Morris Sts., Jersey City, N. J.
McLaughlin, Gormley, King Co., 1715 5th St., S.E., Minneapolis
Monsanto Chemical Co., St. Louis, Mo.
Pace, Inc., Box 206, Wilmington 99. Del.
Peck's Prods. Co., 610 E. Clarence Ave., St. Louis
Pennsalt Chems. Corp., 3 Penn Center Plaza, Phila.
Peterson Filling & Packaging Co., Hegeler Lane, Danville, Ill.
Prentiss Drug & Chem. Co., 101 W. 31 St., N. Y. 1
Puro Co., 2801 Locust St., St. Louis
Residex Corp., Clark, N. J.
Rohm & Haas Co., 222 W. Washington Sq., Philadelphia
Thompson-Hayward Chemical Co., 2915 S. W. Blvd., Kansas City, Mo.
Trio Chem. Wks., 341 Scholes St., Bklyn. 6
Jos. Turner & Co., Ridgefield, N. J.
Uncle Sam Chemical Co., 573 W. 131st St., N. Y. C.
U. S. Sanitary Spec. Corp., 1001 S. California Blvd., Chicago 12
James Varley & Sons, 1200 Switzer Ave., St. Louis

MOTTLED SOAP (see Soap, Mottled)

MURIATIC ACID

Allied Chem. Corp., General Chem. Div., 40 Rector St., N. Y.
American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
Arkansas Louisiana Chem. Co., Shreveport, La.
Diamond Alkali Co., Union Commerce Bldg., Cleveland
E. I. du Pont de Nemours & Co., Wilmington
Dow Chemical Co., Midland. Mich.
Frontier Chem. Co., Wichita, Kan.
Heyden Chem. Div., Heyden Newport Chem. Corp., 342 Madison Ave., N. Y.
Hooker Chemical Corp., Niagara Falls, N. Y.
Monsanto Chemical Co., St. Louis, Mo.
Morton Chem. Co., 110 N. Wacker Dr., Chicago 6
Olin Mathieson Chem. Corp., Ind. Chems., Baltimore 3
Pennsalt Chems. Corp., 3 Penn Center Plaza, Phila.
Reichhold Chemicals, Inc., White Plains, N. Y.
Robeco Chemicals, Inc., 25 E. 26 St., N. Y. 10
Stauffer Chem. Co., 380 Madison Ave., N. Y.
Tennessee Prods. & Chem. Corp., Nashville, Tenn.
Joseph Turner & Co., Ridgefield, N. J.
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13

MUSKS, ARTIFICIAL (see Aromatic Chemicals)

MYRISTYL ALCOHOL (see Fatty Alcohols)

NAPHTHA (see Solvents, Naphtha)

NAPHTHALENE

Allied Chem. Corp., Plastics Div., 40 Rector St., N. Y. C.
American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
Harshaw Chemical Co., 1945 E. 97th St., Cleveland 6
Koppers Co., Chamber of Commerce Bldg., Pittsburgh
Monsanto Chem. Co., St. Louis, Mo.
Neville Chemical Co., Pittsburgh
Penna. Industrial Chem. Corp., Clairton, Penna.
Reilly Tar & Chem. Corp., Merchants Bank Bldg., Indianapolis
Robeco Chemicals, Inc., 25 E. 26th St., N. Y. 10
Standard Chlorine Chem. Co., 115 Jacobus Ave., South Kearny, N. J.
Tar Residuals, Inc., 420 Lexington Ave., N. Y.
U. S. Steel Corp., Pittsburgh 30
Velsicol Corp., 330 E. Grand Ave., Chicago
Witco Chem. Co., 122 E. 42 St., N. Y. 17

NAPHTHALENE SULFONATES

Allied Chem. Corp., National Aniline Div., 40 Rector St., N. Y.
American-British Chem. Supplies, 180 Madison Ave., N. Y. 16
American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
Antara Chemicals, 435 Hudson St., N. Y. 14
Atlantic Refining Co., 260 S. Broad St., Phila.
Continental Chem. Co., 195 21 Ave., Paterson, N. J.
E. I. du Pont de Nemours & Co., Wilmington
Emkay Chem. Co., 319 2nd St., Elizabeth, N. J.
Fine Organics, Inc., 205 Main St., Lodi, N. J.
Geigy Industrial Chems., Ardsley, N. Y.
Marchon Prods., Whitehaven, Cumberland, England.
M. Michel & Co., 90 Broad St., N. Y. 4
Nopco Chem. Co., 60 Park Pl., Newark, N. J.
Onyx Chemical Corp., Warren & Morris Sts., Jersey City, N. J.
Pennsylvania Refining Co., Butler, Pa.
Petrochemicals Co., 420 Lexington Ave., N. Y. 17
Sonneborn Chem. & Refin'g Corp., 300 4th Ave., N. Y.
Ultra Chem. Wks., 2 Wood St., Paterson, N. J.
Witco Chem. Co., 122 E. 42 St., N. Y. 17

NAPHTHENATES

Carlisle Chem. Wks., Inc., Reading, O.
Cuprinol Div.—Darworth, Inc., Simsbury, Conn.
Harshaw Chemical Co., 1945 E. 97th St., Cleveland
Koppers Co., Chamber of Commerce Bldg., Pittsburgh 19
Naftone, Inc., 515 Madison Ave., N. Y. 22
Oronite Div., Calif. Chem. Co., 200 Bush St., San Francisco
Robeco Chemicals, Inc., 26 E. 26th St., N. Y. 10
Socony Mobil Oil Co., 150 E. 42nd St., N. Y. 17
Witco Chem. Corp., 122 E. 42nd St., N. Y. 17

NAPHTHENIC ACIDS (and Sulfonic Sludges)

Atlantic Refining Co., 260 Broad St., Philadelphia
Enjay Chem. Co., 15 W. 51st St., N. Y. 19
Naftone, Inc., 515 Madison Ave., N. Y. 2
Pennsylvania Refining Co., Butler, Pa.
Robeco Chems. Inc., 25 E. 26th St., N. Y. 10
Sonneborn Chem. & Refin'g Corp., 300 4th Ave., N. Y.
Sun Oil Co., 1608 Walnut St., Phila. 3
Texaco, Inc., 135 E. 42nd St., N. Y. 17

NEATSFOOT OIL

Armour Industrial Chem. Co., 110 N. Wacker Dr., Chicago
Neatsfoot Oil Refineries Corp., Ontario & Bath Sts., Phila.
Swift & Co., Hammond, Ind.
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13

NICOTINE COMPOUNDS

California Spray-Chemical Corp., Richmond, Calif.
Hood River Spray Co., Hood River, Ore.
Kemiko Mfg. Co., 500 Chancellor Ave., Irvington, N. J.
Prentiss Drug & Chem. Co., 101 W. 31 St., N. Y. 1

NITRE CAKE (Sodium Acid Sulfate)

Amer. Agricultural Chem. Co., 100 Church St., N. Y.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Rohm & Haas Co., 222 W. Washington Sq., Philadelphia
Monsanto Chemical Co., St. Louis, Mo.
Riches-Nelson, Inc., 342 Madison Ave., N. Y. 17

NITRIC ACID

Allied Chem. Corp., General Chem. Div., 40 Rector St., N. Y.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Hercules Powder Co., Wilmington
Monsanto Chemical Co., St. Louis, Mo.
Olin Mathieson Chem. Co., Ind. Chems., Baltimore 3
Pennsalt Chems. Corp., 3 Penn Center Plaza, Phila.
Stauffer Chem. Co., 380 Madison Ave., N. Y.
Joseph Turner & Co., Ridgefield, N. J.
U. S. Industrial Chems. Co., 99 Park Ave., N. Y. 16

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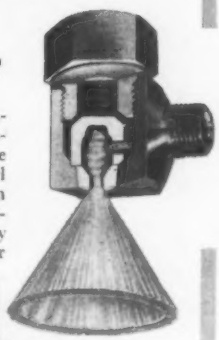

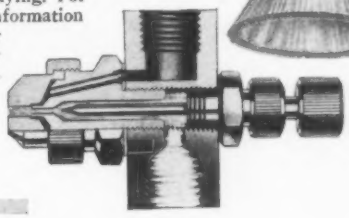

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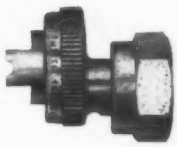

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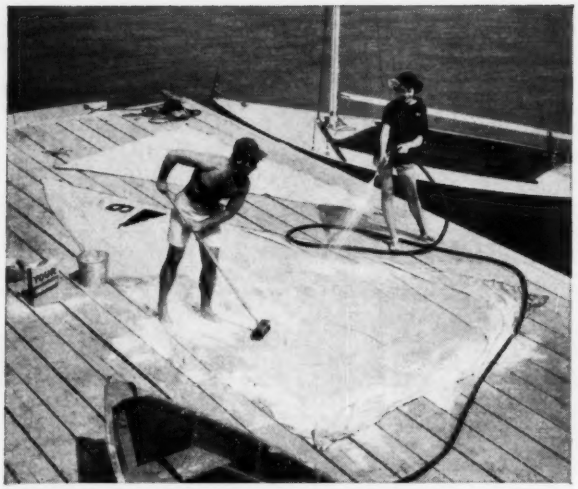

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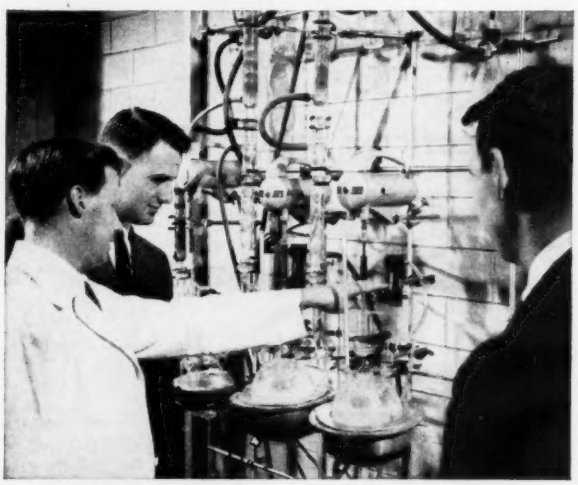

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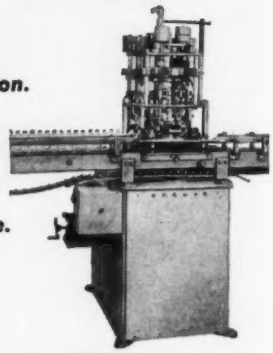

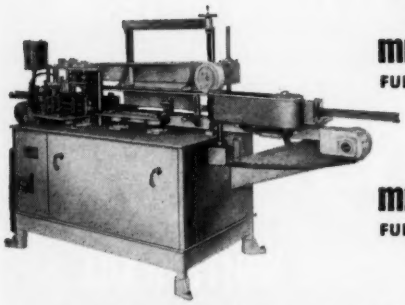

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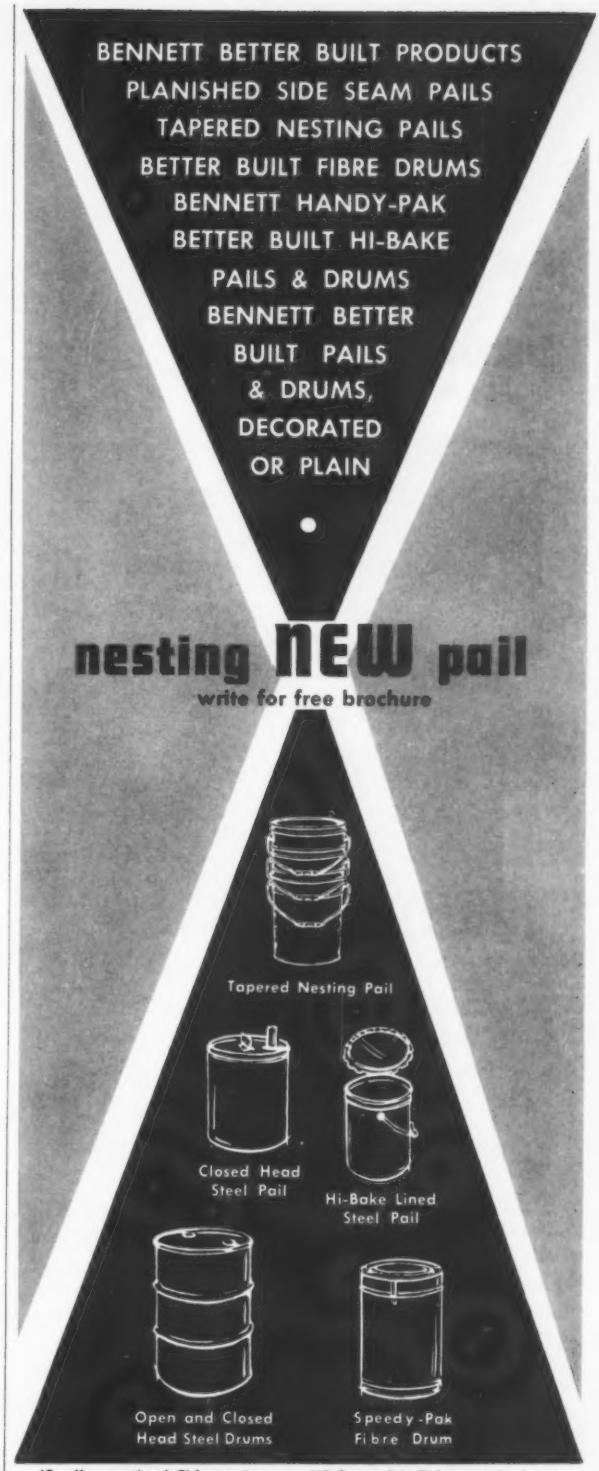

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Vegetable Oil Prods., 5568 E. 61st., Los Angeles
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Wilson-Martin Div., Snyder & Swanson, Phila., Pa.
Woburn Chem. Corp., 1200 Harrison Ave., Kearny, N. J.

PARA BLOCKS (see Deodorizing Blocks)

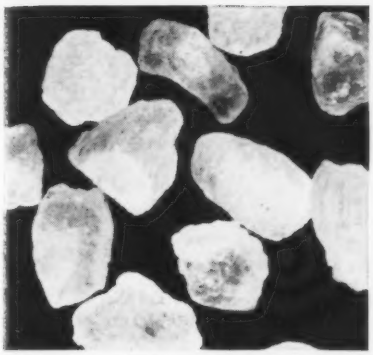
PARADICHLOROBENZENE

Allied Chem. Corp., Solvay Process Div., 61 Broadway, N. Y.
Dow Chemical Co., Midland, Mich.
Hooker Chem. Corp., Niagara Falls, N. Y.
Pittsburgh Plate Glass Co., 1 Gateway Center, Pittsburgh
Robeco Chemicals, Inc., 25 E. 26th St., N. Y. 10
Standard Chlorine Chem. Co., South Kearny, N. J.

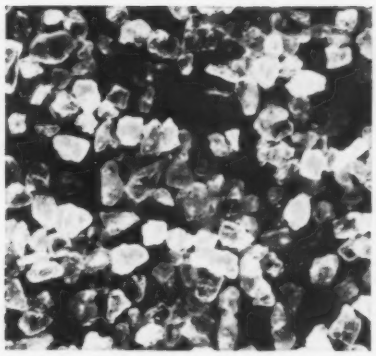
PARADICHLOROBENZENE BLOCKS (see Deodorizing Blocks and Crystals)

PARAFFIN

M. Argueso & Co., 442 Waverly Ave., Mamaroneck, N. Y.
Atlantic Refining So., 260 S. Broad St., Philadelphia
Candy & Co., 2515 W. 35th St., Chicago 32
Continental Oil Co., 1270 Ave. of Americas, N. Y. 20
Cosden Petroleum Corp., Big Spring, Tex.

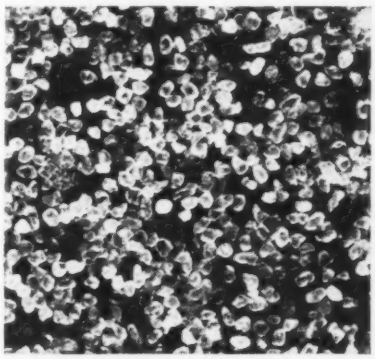


PEA No. 1 Repackage these big sparkling PARADI crystals just as they come from the drum.

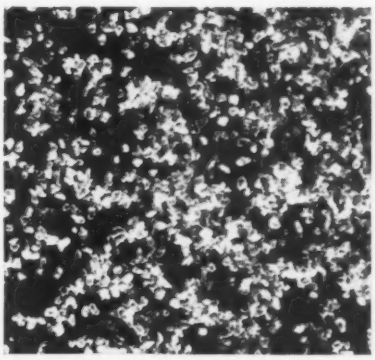


PEA No. 2 A popular size for repackaging in vaporizer cans.

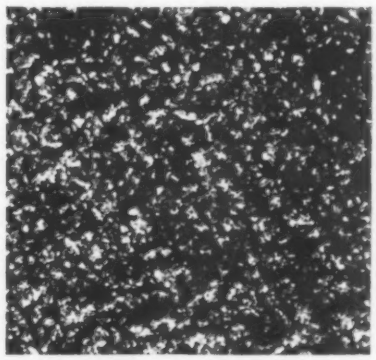
RICE No. 1 Smallest crystals recommended for direct repackaging. Excellent for shaker-top cans.



RICE No. 2 Exceptionally free-flowing, easy packing, for fast refilling of power presses.



RICE No. 3 For foot-operated presses you need a finer crystal like this—free-flowing but small enough to pack and compress easily.



POWDERED Save time in melting and molding with this super-fine fast-melting size.

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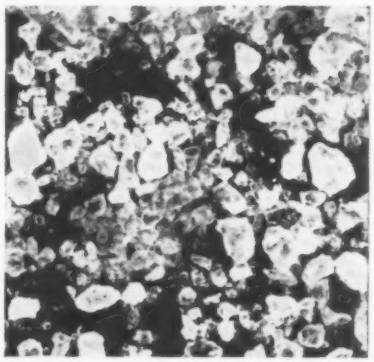

GRANULATED This size is used as an agricultural insecticide and herbicide, and as a chemical intermediate.

The diverse assortment of *para*-dichlorobenzene crystal sizes pictured above is a unique feature of Hooker's Paradi line. Far from being a whimsical advantage, this wide selection simplifies the job of processing or repackaging, thereby keeping costs of such operations to a minimum.

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Moore & Munger Co., 33 Rector St., N. Y. C.
Pennotex Oil Corp., Box 187, Sparta, N. J.
Pennsylvania Refining Co., Butler, Pa.
Petroleum Specialties, Inc., 205 E. 42nd St., N. Y. 17
Robeco Chemicals, Inc., 25 E. 26th St., N. Y. 10
Frank B. Ross Co., 6-10 Ash St., Jersey City, N. J.
William H. Scheel, Inc., 38 Franklin St., Bklyn. 22
Shell Oil Co., 50 W. 50th St., N .Y. 20
Sinclair Petrochems., 630—5th Ave., N. Y.
Socony Mobil Oil Co., 150 E. 42nd St., N. Y. 17
Sonneborn Chem. & Refin'g Corp., 300 4th Ave., N. Y. 10
Standard Oil Co., (Calif), 225 Bush St., San Francisco
Standard Oil Co., (Ohio), Midland Bldg., Cleveland
Sun Oil Co., 1608 Walnut St., Phila.
Warwick Wax Div., 2 W. 45 St., N. Y. 36

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Amsco Solvents & Chems. Co., 4619 Reading Rd., Cincinnati
Atlantic Refining Co., 260 S. Broad St., Philadelphia
Buffalo Sols. & Chems. Co., Box 73, Sta. B. Buffalo, 7
Central Solvents & Chems. Co., 2540 W. Flournoy St., Chicago
Continental Oil Co., 1270 Ave. of Americas. N. Y. 20
Dixie Sols. & Chems. Co., Dixie Highway, Louisville, Ky.
Esso Standard Oil Co., 15 W. 51st St., N. Y. 19
Gulf Refining Co., Pittsburgh
Hoosier Sols. & Chems. Co., 1650 Luett Ave., Indianapolis, Ind.
International Wax Ref. Corp., E. Hawthorne Ave., Valley Stream, N. Y.
Missouri Sols. & Chems. Co., 419 De Soto Ave., St. Louis
Ohio Sols. & Chems. Co., 3470 W. 140th St., Cleveland
Pennsylvania Refining Co., Butler, Pa.
Petroleum Specialties, Inc., 205 E. 42nd St., N. Y. 17
Robeco Chemicals, Inc., 25 E. 26th St., N. Y. 10
Sinclair Petrochems., 630—5th Ave., N. Y.
Skelly Oil Co., Skelly Bldg., Kansas City, Mo.
Socony Mobil Oil Co., 150 E. 42nd St., N. Y. 17
Sonneborn Chem. & Refin'g Corp., 300 4th Ave., N. Y.
Southern Sols. & Chems. Corp., 917 Jefferson Highway, New Orleans
Standard Oil Co., (Calif.) 225 Bush St., San Francisco
Standard Oil Co., (Ohio), Midland Bldg., Cincinnati
Sun Oil Co., 1608 Walnut St., Phila. 3
Texas Sols. & Chems. Co., 8501 Market St., Houston, Texas
Toledo Sols. & Chems. Co., 4051 South Ave., Toledo
Warwick Wax Div., 2 W. 45 St., N. Y. 36
Western Sols. & Chems. Co., 6472 Selkirk Ave., Detroit
Wisconsin Sols. & Chems. Co., 1719 S. 83rd St., Milwaukee 14
Wolverine Sols. & Chems. Co., 2940 Stafford Ave., S.W., Grand Rapids

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Robeco Chemicals, Inc., 23 E. 26th St., N. Y.

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American Potash & Chem. Corp., 3030 W. 6th St., Los Angeles
Chemagro Corp., 437 5th Ave., N. Y. 16
Diamond Alkali Co., Union Commerce Bldg., Cleveland
Monsanto Chemical Co., St. Louis, Mo.
Shell Chem. Co., 50 W. 50 St., N. Y.
Stauffer Chem. Co., 380 Madison Ave., N. Y.
Victor Chem. Wks., 155 N. Wacker Dr., Chicago

PATCHOULI OIL (see Essential Oils)

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E. F. Drew & Co., 15 E. 26 St., N. Y. 10
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Falk & Co., Pittsburgh 30
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Pacific Vegetable Oil Corp., 1145 S. 10th St., Richmond, Calif.
J. H. Redding, Inc., 17 Battery Place, N .Y.
Robeco Chemicals, Inc., 23 E. 26th St., N. Y. 10
Sergeant Chem. Co., 7 Dey St., N. Y.
Swift & Co., Hammond, Ind.
Welch, Holme, & Clarke Co., 1 Hudson St., N. Y. 13

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Kamen Soap Prods. Co., 5-22 50 Ave., L. I. C. 1, N. Y.
Swift & Co., Hammond, Ind.
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Woburn Chem. Corp., 1200 Harrison Ave., Kearny, N. J.

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Pennsalt Chems. Corp., 3 Penn Center, Phila.
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Universal Electric Products, 2201 Regent St., Madison 5, Wisc.
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American-British Chems. Supplies, 180 Madison Ave., N. Y. 16
Aromatic Products, Inc., 235 4th Ave., N Y. 3
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W. J. Bush & Co., 137 Boston Post Rd., Cos Cob, Conn.
Charabot & Co., 114 E. 25th St., N. Y.
Antoine Chiris Co , 220 E. 23rd St., N. Y.
Coutin Associates, 381 Park Ave., S., N. Y. 16
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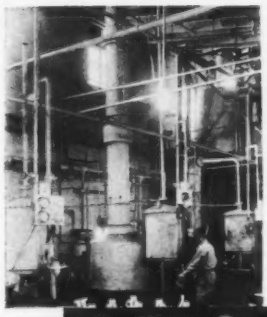
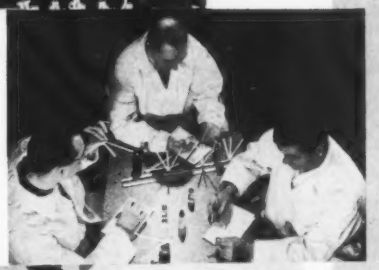
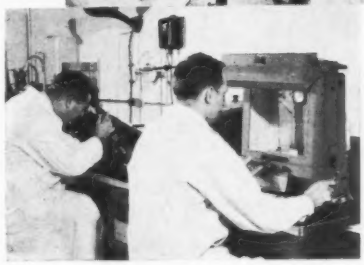
Dragoco, Inc., King Rd., Totowa, N. J.
P. R. Dreyer, Inc., 601 W. 26th St., N. Y.
Eastman Chemical Prods. Co., Kingsport, Tenn.
Felton Chemical Co., 603 Johnson Ave , Brooklyn, N. Y.
Firmenich, Inc., 250 W. 18th St., N. Y.
Flam-Haft Laboratories, 8 E. 12 St., N. Y. 3







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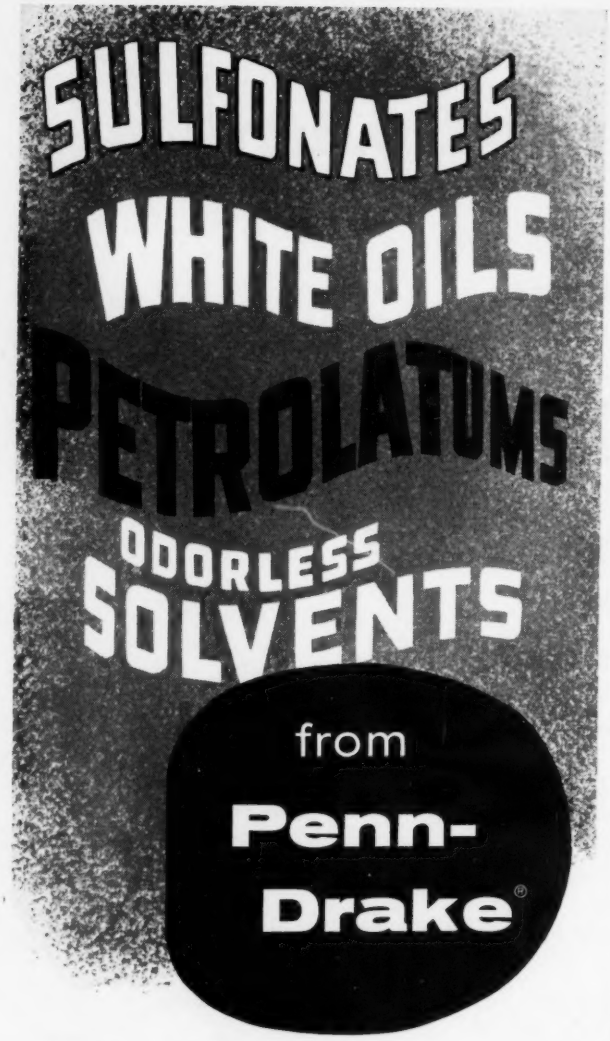

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Geo. Lueders & Co., 427 Washington St., N. Y.
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N. Y. Aromatics Corp., High Bridge, N. J.
Neumann-Buslee & Wolfe, 5800 Northwest Highway, Chicago
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Noville Essential Oil Co., 1312 5th St., N. Bergen, N. J.
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Roure-Dupont, Inc., 366 Madison Ave., N. Y.
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Edwin Seebach Co., 912 Broadway, N. Y.
Seeley & Co., Nyack, N. Y.
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Tombarel Products Corp., 725 Broadway, N. Y. 3
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Magie Bros. Oil Co., 9101 Fullerton Ave., Franklin Park, Ill.
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Pennsylvania Refining Co., Butler, Pa.
Robeco Chemicals, Inc., 23 E. 26th St., N. Y. 10
Sinclair Petrochems., 630 Fifth Ave., N. Y.
Socony Mobil Oil Co., 150 E. 42nd St., N. Y. 17
Sonneborn Chem. & Refin'g Corp., 300 4th Ave., N. Y.
Standard Oil Co., (Calif.), 225 Bush St., San Francisco
Standard Oil Co., (N. J.), 26 Broadway, N. Y.
Warwick Wax Div., 2 W. 45 St., N. Y. 36
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13

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PETROLEUM SOLVENTS (see Solvents, Petroleum)

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Amoco Chems. Co., 130 E. Randolph Dr., Chicago 1
Atlantic Refining Co., 260 S. Broad St., Philadelphia
Continental Oil Co., 1270 Ave. of Americas, N. Y. 20
Enjay Chem. Co., 15 W. 51st St., N. Y.
M. Michel & Co., 90 Broad St., N. Y. 4
Oronite Div., Calif. Chem. Co., 200 Bush St., San Francisco
Pennotex Oil Corp., Box 187, Sparta, N. J.
Pennsylvania Refining Co., Butler, Pa.
Robeco Chemicals, Inc., 23 E. 26th St., N. Y. 10
Shell Chem. Co., 50 W. 50 St., N. Y.
Sinclair Petrochems., 600 5th Ave., N. Y. 20
Sole Chem. Corp., 7740 S. Chicago Ave., Chicago
Sonneborn Chem. & Refin'g Corp., 300 4th Ave., N. Y.
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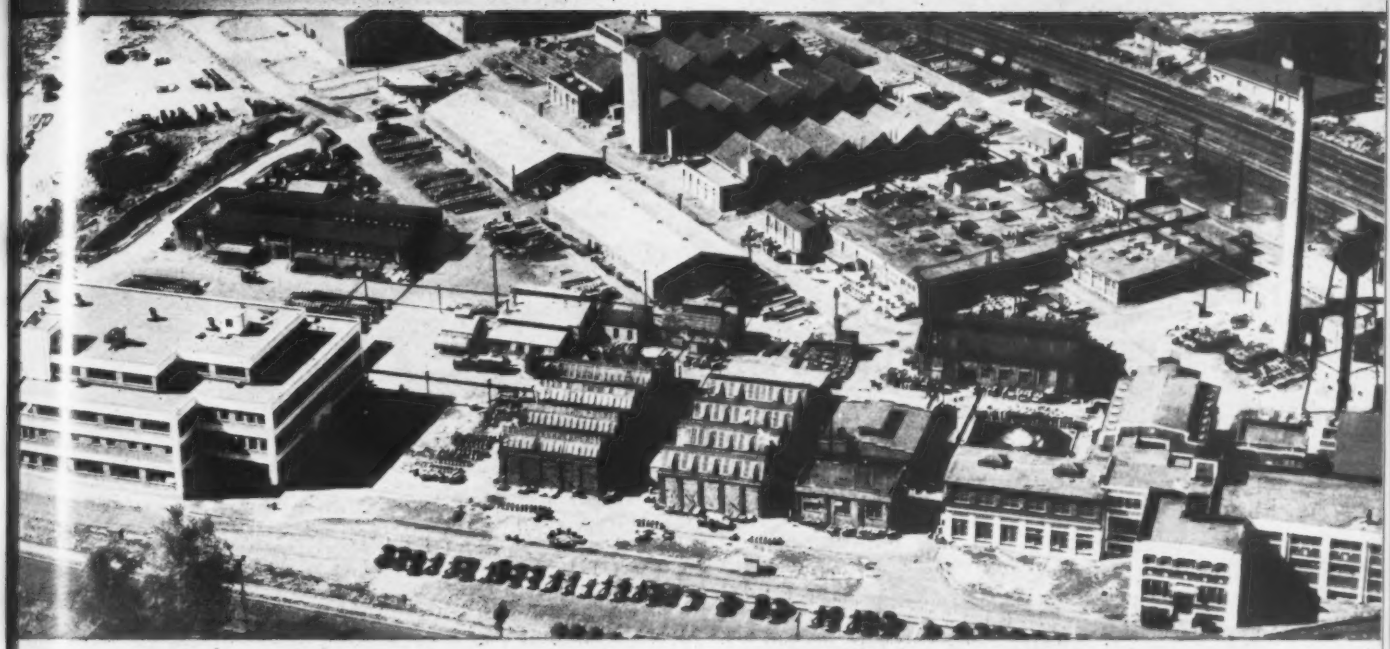

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Hercules Powder Co., Wilmington, Del.
Hooker Chem. Corp., Niagara Falls, N. Y.
Koppers Co., Chamber of Commerce Bldg., Pittsburgh
Monsanto Chemical Co., St. Louis, Mo.
Oronite Div., Calif. Chem. Co., 200 Bush St., San Francisco
Reichhold Chemicals, Inc., White Plains, N. Y.
Reilly Tar & Chem. Corp., Merchants Bank Bldg., Indianapolis
Robeco Chemicals, Inc., 23 E. 26th St., N. Y. 10
Union Carbide Chems. Co., 270 Park Ave., N. Y.
U. S. Steel Corp., Pittsburgh 30

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pH INDICATORS

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National Technical Labs., 820 Mission St., South Pasadena, Calif.
Pfaltz & Bauer, 350—5th Ave., N. Y.
W. A. Taylor Co., 7300 York Rd., Baltimore
Arthur M. Thomas Co., Vine St., at 3rd, Phila.

PHOSPHATES (see under Individual Headings)

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American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
Blockson Chemicals, Joliet, Ill.
E. I. du Pont de nemours & Co., Wilmington, Del.
Food Machy. & Chem. Corp., 161 E. 42 St., N. Y.
A. M. Maas Chem. Co., 4570 Ardine St., South Gate, Calif.
Monsanto Chemical Co., St. Louis, Mo.
Phosphorus Div., Hooker Chem. Corp., 666 5 Ave., N. Y.
Rumford Chem. Wks., Rumford, R. I.
Stauffer Chem. Co., 380 Madison Ave., N. Y.
Joseph Turner & Co., Ridgefield, N. J.
U. S. Industrial Chems. Co., 99 Park Ave., N. Y. 16
Victor Chem. Wks., 155 N. Wacker Dr., Chicago 6
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Buffalo Solvents & Chem. Corp., P. O. #73, Station B, Buffalo
Central Solvents & Chemicals Co., 2540 W. Flournoy St., Chicago
Continental Turp. & Rosin Corp., Laurel, Miss.
Dixie Pine Prods. Co., Hattiesburg, Miss.
Dixie Solvents & Chems. Co., Dixie Highway, Louisville
Glidden Co., Jacksonville, Fla.
Gulf Naval Stores Supply Co., Whitney Bldg., New Orleans
Hercules Powder Co., Wilmington, Del.
Hoosier Solvents & Chems. Corp., 1650 Luett St., Indianapolis
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Missouri Solvents & Chems. Co., 419 DeSoto, St. Louis
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Western Sols. & Chems. Co., 6472 Selkirk Ave., Detroit
Wisconsin Solvents & Chem. Corp., 1719 S. 83rd St., Milwaukee
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13
Wolverine Solv. & Chems. Co., 2940 Stafford Ave., S.W., Grand Rapids

PINE SCRUB SOAPS (see Soap, Potash)

PIPE COILS

Harrisburg Steel Corp., Harrisburg, Pa.
Hartford Tube Products Co., Hartford, Conn.
Houchin Division, 300 Straight St., Paterson, N. J.
National Pipe Bending Co., New Haven, Conn.
Philadelphia Pipe Bending Co., 4100 N. 5th St., Phila.
Pittsburgh Pipe Coil & Bending Co., Etna, Pa.
Rempe Co., 340 N. Sacramento Blvd., Chicago
Whitlock Coil Pipe Co., Hartford, Conn.

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McLaughlin Gormley King Co., 1715 5 St., Minneapolis
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PLASTIC DIP TUBES (see Aerosol Dip Tubes)

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Baker Castor Oil Co., 40 Ave. A, Bayonne, N. J.
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Monsanto Chemical Co., St. Louis, Mo.
Penna. Industrial Chem. Corp., Clairton, Pa.
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Tenn. Prods. & Chem. Corp., 2611 West End Ave., Nashville, Tenn.
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Mecchaniche Moderne, Corso Sempione 51, Busto Arsizio, Italy
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Davies-Young Soap Co., Dayton, O.
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Fine Organics, Inc., 205 Main St., Lodi, N. J.
Frontier Chem. Prods., 119 E. Soper St., St. Louis
Fuld Bros., 702 S. Wolfe St., Baltimore
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Klix Chem. Co., 551 Railroad Ave., S. San Francisco
Kemiko Mfg. Co., 500 Chancellor Ave., Irvington, N. J.
Maloney Chem. Co., Green Bay, Wis.
McAleer Mfg. Corp., 101 S. Waterman Ave., Detroit 17
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New Jersey Chem. Co., 56 Park Ave., Lyndhurst, N. J.
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Sonneborn Chem. & Refin'g Corp., 300 4th Ave., N. Y.
Southern Chemical Prods. Co., 170 Poplar St., Macon, Ga.
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Surety Laboratories, 3946 Olive St., St. Louis 8
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Trio Chem. Wks., 341 Scholes St., Bklyn.
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Dettelbach Chem. Corp., 4111 Peachtree Rd., Atlanta 19
Emulso Corp., 301 Ellicott St., Buffalo, N. Y.
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G.N.S. No. 5	7.76	0.932	1.482	200	212	220	167	Inf.	0.5%

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Pace, Inc., MacArthur Rd., Wilmington, Dela.
Pan American Chem. Co., 1201 N.W. 1st Ave., Miami, Fla.
Perrow Chem. Co., Hurt, Va.
Peterson Filling & Packaging Co., Hegeler Lane, Danville, Ill.
Purex Corp., Box 9686, Philadelphia, Pa.
Puro Co., 2801 Locust St., St. Louis 3
Ralm Prods., Inc., 206 S. Larkin Ave., Joliet, Ill.
Simoniz Co., 2100 Indiana Ave., Chicago 16
Southern Chem. Prods. Co., 170 Poplar St., Macon, Ga.
John C. Stalfort & Sons, 319 W. Pratt St., Baltimore
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Surety Laboratories, 3946 Olive St., St. Louis 8
Tex-ite Prods. Corp., 859 E. 43 St., Brooklyn
Trio Chem. Wks., 341 Scholes St., Bklyn.
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U. S. Sanitary Specialties Corp., 1001 S. California Ave., Chicago 12
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Dow Chemical Co., Midland, Mich.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Eastman Chem. Prods., Kingsport, Tenn.
Hercules Powder Co., Wilmington
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Bradley-Sun Division, 181 Long Ave., Hillside, N. J.
Celanese Plastics Co., 744 Broad St., Newark, N. J.
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Houston Plastics Prods. Inc., 7006 Burkett St., Tex.
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Wheaton Plastic-Cote Corp., Millville, N. J.

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Central Solvents & Chemicals Co., 2540 W. Flournoy St., Chicago
Continental Oil Co., 1270 Av. of Americas, N. Y. 20
Dixie Solvents & Chemicals Co., Dixie Highway, Louisville, Ky.
Dow Chem. Co., Midland, Mich.
Hoosier Solvents & Chemicals Co., 419 De Soto Ave., St. Louis
Jefferson Chemical Co., 1121 Walker Ave., Houston, Tex.
Ohio Solvents & Chemicals Co., 3470 W. 140th St., Cleveland
Olin Mathieson Chem. Corp., Org. Chems., 745 5th Ave., N. Y. 22
Southern Solvents & Chemicals Corp., 917 Jefferson Highway, New Orleans
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Union Carbide Chems. Co., 270 Park Ave., N. Y. C.
Western Solvents & Chemicals Co., 6472 Selkirk Ave., Detroit
Wisconsin Solvents & Chemicals Co., 1719 S. 83rd St., Milwaukee 14
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General Aniline & Film Corp., 435 Hudson St., N. Y.
B. F. Goodrich Chem. Co., 3135 Euclid Ave., Cleveland
Monsanto Chemical Co., St. Louis, Mo.
Morton Chem. Co., 110 N. Wacker Dr., Chicago 6
National Starch & Chem. Corp., 750 3rd Ave., N. Y. 17
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Epolene HDE	1500	455	0.956	1
Epolene LVE	1500	400	0.939	5
Epolene N	2500	2500	0.928	1
Epolene HD	1500	340	0.938	0.5
Epolene LV	1500	360	0.925	3
Epolene C	7000	16,000	0.907	7

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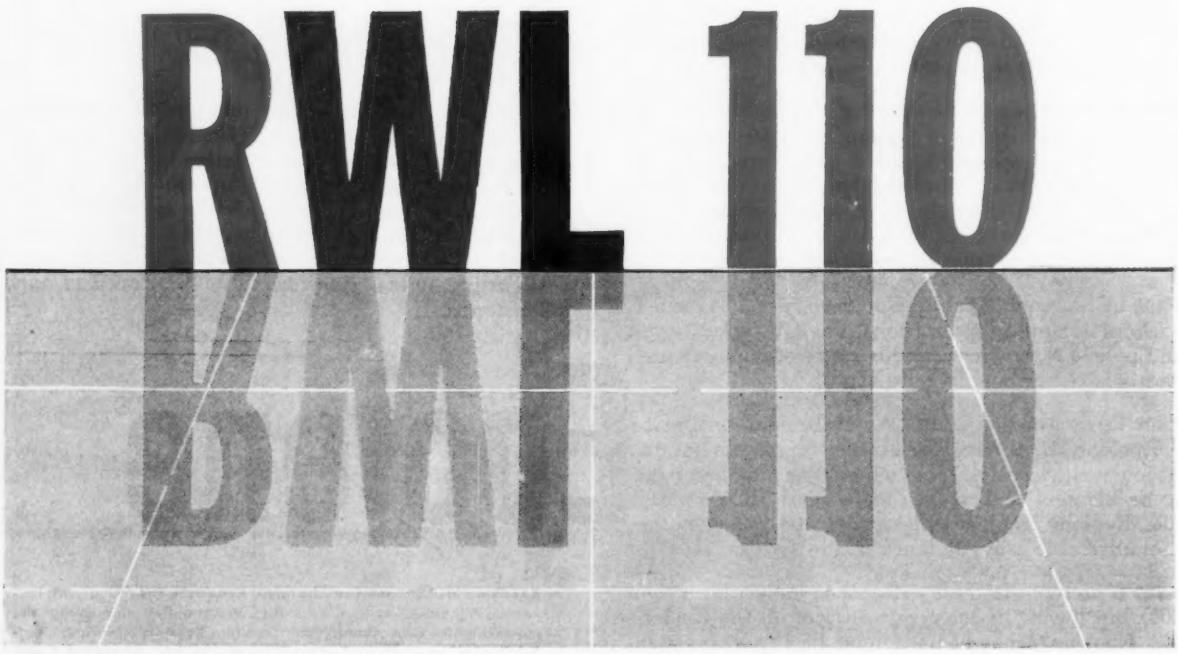

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S. O. S. Co., 7123 W. 65 St., Chicago
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POTASH (Caustic Potash)

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Antara Chemicals, 435 Hudson St., N. Y. 14
Diamond Alkali Co., Union Commerce Bldg., Cleveland
Dow Chem. Co., Midland, Mich.
E. I. du Pont de Nemours & Co., Wilmington, Del.
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Hooker Chemical Corp., Union St., Niagara Falls, N. Y.
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Jefferson Chem. Co., 1121 Walker Ave., Houston, Texas
Monsanto Chemical Co., St. Louis, Mo.
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POTASSIUM CARBONATE

Allied Chem. Corp., Solvay Process Div., 61 Broadway, N. Y.
J. T. Baker Chem. Co., Phillipsburg, N. J.
Food Machy. & Chem. Corp., 441 Lexington Ave., N. Y. C.
Harshaw Chemical Co., 1945 E. 97th St., Cleveland 6
Hooker Chemical Corp., Niagara Falls, N. Y.
International Minerals & Chems. Corp., Old Orchard Rd., Skokie, Ill.
Merck & Co., Rahway, N. J.
Robeco Chemicals, Inc., 23 E. 26th St., N. Y. 10
Jos. Turner & Co., Ridgefield, N. J.
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13

POTASSIUM PERSULFATE

Allied Chem. Corp., General Chem. Div., 40 Rector St., N. Y.
J. T. Baker Chem. Co., Phillipsburg, N. J.
Food Machy. & Chem. Corp., 166 E. 42 St., N. Y.
Merck & Co., Rahway, N. J.
Pennsalt Chems. Corp., 3 Penn Center Plaza, Phila.
Jos. Turner & Co., Ridgefield, N. J.

POTASSIUM PHOSPHATES

Allied Chem. Corp., General Chem. Div., 40 Rector St., N. Y.
Blockson Chemicals, Joliet, Ill.
Hooker Chem. Corp., 666 5th Ave., N. Y. C.
A. R. Maas Chem. Co., 4570 Ardine St., South Gate, Calif.
Food Machy. & Chem. Corp., 166 E. 42 St., N. Y.
Monsanto Chemical Co., St. Louis, Mo.
Joseph Turner & Co., Rigdefield, N. J.
Victor Chemical Works, 155 N. Wacker Dr., Chicago 6
Virginia Carolina Chem. Corp., Richmond, Va.

POTASSIUM SILICATE

Cowles Chem. Co., 7016 Euclid Ave., Cleveland 3
E. I. du Pont de Nemours & Co., Wilmington, Del.
Harshaw Chemical Co., 1945 E. 97th St., Cleveland 6
Philadelphia Quartz Co., 1056 Public Ledger Bldg., Phila. 6
Joseph Turner & Co., Ridgefield, N. J.
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13

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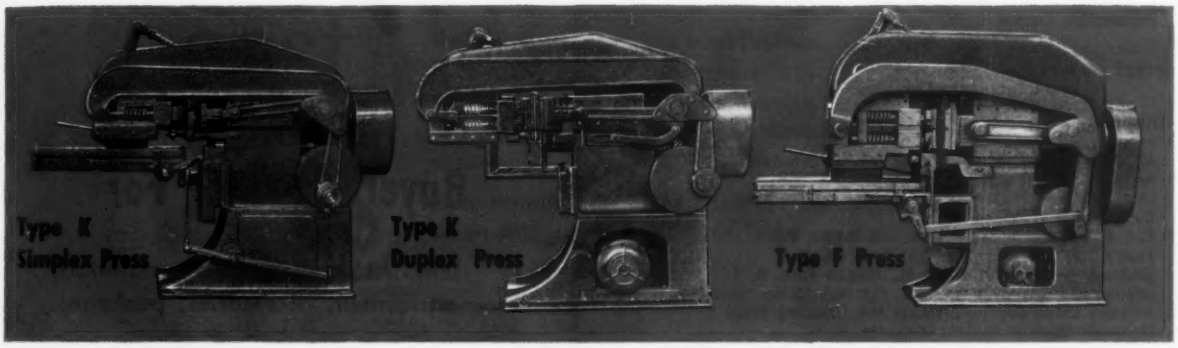
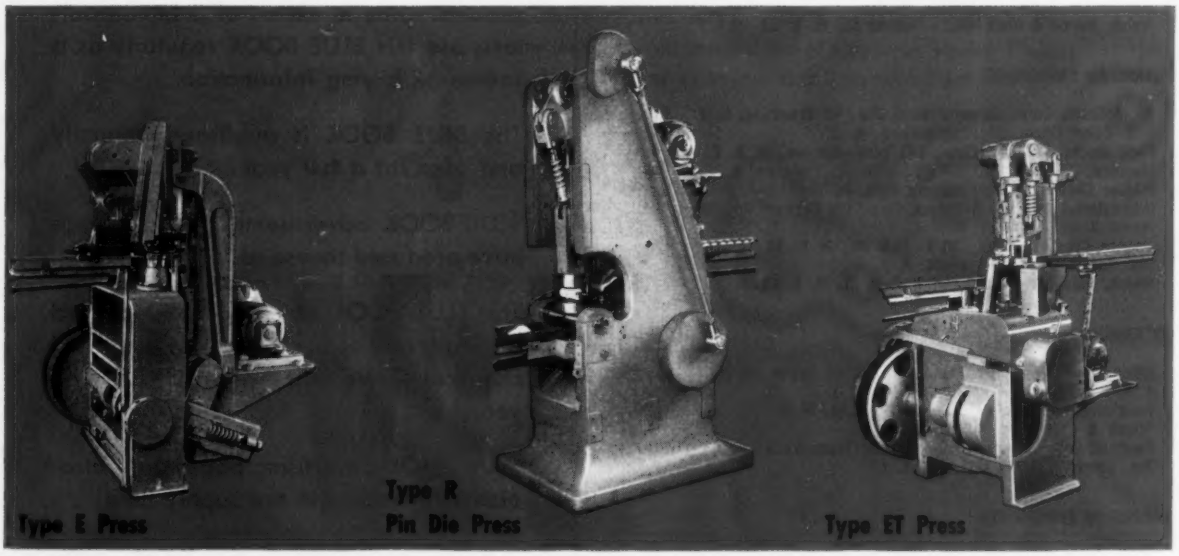


For toilet or laundry soap cakes of any shape (except highly convex cakes) with side band. Speeds of 120-140 cakes per minute.

Applications same as Type K Simplex. Presses two cakes simultaneously. Speeds up to 250 cakes per minute.

For large toilet or laundry soap cakes. Available in Simplex or Duplex Models, pressing one or two cakes per stroke.



For small toilet soap cakes (1½ oz. or less). Speeds up to 200 cakes per minute.

For toilet soap cakes of unusual shape, oval cakes, or cakes having highly convex faces, with or without side band. Speeds up to 100 cakes per minute.

For small toilet soap cakes with side band. Speeds up to 120 cakes per minute.

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American Potash & Chem. Corp., 3030 W. 6th St., Los Angeles 54
U. S. Borax & Chem. Corp., 50 Rockefeller Plaza, N. Y.

POURING SPOUTS (see Can Spouts)

POWDERED HAND SOAP (see Soap, Hand)

POWDERED SOAP (see Soap, Powdered)

PREMIUMS

Anchor Hocking Glass Corp., Lancaster, O.
Charles Brand Novelty Corp., 154 W. 27th St., N. Y. 1
J. L. Clark Mfg. Co., 2300 6th St., Rockford, Ill.
Federal Tool Corp., 3600 W. Pratt Blvd., Chicago
Goody Mfg. Co., 15 E. 22nd St., N. Y. (novelties)
Hazel-Atlas Co., Wheeling, W. Va., (glassware)
Holgate Co., Kane, Pa., (woodenware Toys)
Keystone Processed Prods. Co., 683 Broadway, N. Y.

PRESSES (Tablet)

Arthur Colton Co., 3431 E. Lafayette Ave., Detroit 7
First Machy. Corp., 209 10th St., Bklyn. 15 (Used)
F. J. Stokes Corp., 5500 Tabor Rd., Phila.
Swan Machine Co., 320 Fifth Ave., N. Y.

PRESSES (Automatic Soap)

First Machy. Corp., 209 10 St., Bklyn. 15 (Used)
Houchin Division, 300 Straight St., Paterson, N. J.
R. A. Jones & Co., Box 485, Cincinnati
G. Mazzoni, Busto Arsizio, Italy
Newman Tallow & Soap Machy. Co., 3601 S. Iron St., Chicago (Used)

PRESSES (Foot and Hand Lever for Soap and Para Cakes)

First Machinery Corp., 209 10 St., Bklyn. (Used)
Houchin Division, 300 Straight St., Paterson, N. J.
R. A. Jones Co., Box 485, Cincinnati, O.
G. Mazzoni, Busto Arsizio, Italy
Newman Tallow & Soap Machy. Co., 1051 W. 35th St., Chicago (Used)
Henry Simon Ltd., Cheadle Heath, Stockport, England
Vickers Ltd., Westminster, London, England

PRIVATE BRAND FORMULATIONS (see listings under individual headings)

PRIVATE LABEL PACKAGING, FILLING (see Contract Packaging; Packaging for the trade)

PROPELLANTS (see Aerosol Propellants)

PROPORTIONERS, SOAP AND DETERGENT (see Soap Solutionizing Devices)

PROTECTIVE HAND CREAMS (see Hand Creams, Protective)

PROPYL ALCOHOL (see Alcohol, Isopropyl)

PROPYLENE GLYCOL

Allied Chem. Corp., Plastics Div., 40 Rector St., N. Y.
Amsco Sols. & Chems. Co., 4619 Reading Rd., Cincinnati
Buffalo Solvs. & Chems. Co., Box 73, Sta. B, Buffalo, N. Y.
Celanese Corp. of America, 180 Madison Ave., N. Y.
Central Sols. & Chems. Co., 2540 W. Flournoy St., Chicago
Dixie Sols. & Chems. Co., Dixie Highway, Louisville
Dow Chemical Co., Midland, Mich.
Glyco Chemicals Division, 417 5 Ave., N. Y.
Hoosier Sols. & Chems. Co., 1650 Luett Ave., Indianapolis, Ind.
Jefferson Chem. Co., 1121 Walker Ave., Houston, Tex.
Missouri Sols. & Chems. Co., 419 De Soto Ave., St. Louis
Ohio Sols. & Chems. Co., 3470 W. 140th St., Cleveland
Olin Mathieson Chem. Corp., Org. Chems., 745 5 Ave., N. Y.
Robeco Chemicals, Inc., 23 E. 26th St., N. Y. 10
Southern Sols. & Chems. Corp., 917 Jefferson Highway, New Orleans
Texas Sols. & Chems. Co., Market St., Houston
Toledo Sols. & Chems. Co., 4051 South Ave., Toledo, O.
Union Carbide Chems. Co., 270 Park Ave., N. Y.
Western Sols. & Chems. Co., 6472 Selkirk Ave., Detroit
Wisconsin Sols. & Chems. Co., 1719 S. St., Milwaukee
Wolverine Sols. & Chems. Co., 2940 Stafford Ave., SW, Grand Rapids
Wyandotte Chemicals Corp., Mich. Alkali Div., Wyandotte, Mich.

PUMICE

California Industrial Minerals Co., Friant, Calif.
Chas B. Crystal Co., 53 Park Pl., N. Y.
LaRue-Axtell Pumice Co., Callaway, Nebr.
Pacific Coast Pumice Co., Bishop, Calif.
James J. Rhodes & Co., 157 W. Hubbard St., Chicago
Wm. R. Rogers, 80 Park St., Beverly, Mass.
Robeco Chemicals, Inc., 23 E. 26th St., N. Y. 10
Tamms Industries, Inc., 228 N. 6th St., Phila.
Charles A. Wagner Co., 4455 N. 6th St., Phila.
Whittaker, Clark & Daniels, 100 Church St., N. Y.

PUMPS (Barrel and Drum Dispensing)

Blackmer Pump Co., Century Ave., SW, Grand Rapids, Mich.
Charles Prods. Co., Gyman-Petro Bldg., Hutchinson, Kansas
Eco Engineering Co., 12 New York Ave., Newark, N. J.
Force-Flo, Inc., 1527 Coit St., Cleveland, O.
Gray Co., 60-11th Ave., NE, Minneapolis
Haag Laboratories, Inc., 14000 S. Seeley Ave., Blue Island, Ill.
Hub States Chems. & Equipment, 1255 N. Windsor St., Indianapolis
Manton-Gaulin Mfg. Co., Everett, Mass.
Multi-Meter Corp., 1635 Coining Dr., Toledo, O.
Terris Div. Consolidated Siphon Supply Co., 22 Wooster St., N. Y.

PUMPS (General Purpose)

Aldrich Pump Co., Pine St., Allentown, Pa.
Alsop Engineering Corp., Milldale, Conn.
Aurora Pump Division, Aurora, Ill.
Carver Pump Co., Muscatine, Iowa
Corkens, Inc., P. O. Box 1062, Olkahoma City, Okla.
Dorr-Oliver, Inc., Stamford, Conn.
Eastern Industries, Inc., Hamden, Conn.
Easy Industries, 210 N. Racine Ave., Chicago
Gray Co., 60 11th Ave., Minneapolis
Manton-Gaulin Mfg. Co., Everett, Mass.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Proportioneers, Inc., Harris Ave., Providence, R. I.
Robbins & Myers, Inc., Lagonda Ave., Springfield, O.
F. J. Stokes Corp., 5500 Tabor Rd., Phila.
Terris Div. Consolidated Siphon Supply Co., 22 Wooster St., N. Y.
Viking Pump Co., Cedar Falls, Iowa
Warren Pumps, Inc., Warren, Mass.
Worthington Corp., Harrison, N. J.

PYRETHRUM EXTRACT

Food Machy. & Chem. Corp., 441 Lexington Ave., N. Y. C.
McLaughlin, Gormley, King Co., 1715 Fifth St., S.E., Minneapolis
S. B. Penick & Co., 100 Church St., N. Y.
Prentiss Drug & Chem. Co., 101 W. 31st St., N. Y. 1

PYRETHRUM FLOWERS AND POWDER

Biddle Sawyer Corp., 20 Vesey St., N. Y. 7
California Spray-Chemical Corp., Richmond, Calif.
McLaughlin, Gormley, King Co., 1715 Fifth St., S.E., Minneapolis
S. B. Penick & Co., 100 Church St., N. Y.
Prentiss Drug & Chem. Co., 101 W. 31st St., N. Y. 1

PYRETHRUM POWDER (Insect Powder)

Food Machy. & Chem. Corp., 441 Lexington Ave., N. Y. C.
McLaughlin, Gormley, King Co., 1715 Fifth St., S.E., Minneapolis
S. B. Penick & Co., 100 Church St., N. Y.
Prentiss Drug & Chem. Co., 101 W. 31st St., N. Y. 1

PYROPHYLLITE

Chas. B. Chrystal Co., 53 Park Pl., N. Y.
Glendon Pyrophyllite Co., Greensboro, N. C.
Minerals & Chems. Philipp Corp., Menlo Park, N. J.
Minerals & Chems. Corp. of America, Menlo Park, N. J.
Tamms Industries, Inc., 229 N. La Salle St., Chicago
R. T. Vanderbilt Co., 230 Park Ave., N. Y.
Welch, Holme & Clark Co., 1 Hudson St., N. Y.
Whittaker, Clark & Daniels, 100 Church St., N. Y.

QUATERNARY AMMONIUM COMPOUNDS

American Alcolac Corp., 3440 Fairfield Rd., Baltimore
American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
Antara Chemicals, 435 Hudson St., N. Y. 14
Archer-Daniels-Midland Co., Minneapolis, Minn.
Armour Industrial Chemical Co., 110 N. Wacker Dr., Chicago
J. T. Baker Chemical Co., Phillipsburg, N. J.
Commercial Solvents Corp., 260 Madison Ave., N. Y. 17
E. I. du Pont de Nemours & Co., Wilmington, Del.
Fine Organics, 205 Main St., Lodi, N. J.
Fleetwood Prods. Co., 509 5th Ave., N. Y. 17
Geigy Industrial Chem., Ardsley, N. Y.
General Mills, Chem. Div., Kankakee, Ill.
Hooker Chemical Corp., Union St., Niagara Falls, N. Y.
Intex Chem. Corp., 167 Main St., Lodi, N. J.
Merck & Co., Rahway, N. J.
M. Michel & Co., 90 Broad St., N. Y. 4
Miranol Chem. Co., 277 Coit St., Irvington, N. J.
Onyx Chemical Corp., Warren & Morris Sts., Jersey City 2, N. J.
Process Chems. Co., 8733 S. Dice Rd., Santa Fe Springs, Calif.
Refined Products Co., 624 Schuyler Ave., Lyndhurst St., N. J.
Rohm & Haas, 222 W. Washington Sq., Phila.
Rozilda Laboratories, 44-18 Purvis St., L. I. C., N. Y.
Sole Chem. Corp., 7740 S. Chicago Ave., Chicago
Stecker Chems., Inc., 45 N. Broad St., Ridgewood, N. J.
Sterwin Chemicals, Inc., 1450 Broadway, N. Y. 18
Textilana Corp., 12607 Cerise Ave., Hawthorne, Calif.
Joseph Turner & Co., Ridgefield, N. J.
R. T. Vanderbilt Co., 230 Park Ave., N. Y.
Witco Chem. Co., 122 E. 42nd St., N. Y. 17
Wyandotte Chemicals Corp., Mich. Alkali Div., Wyandotte, Mich.

QUATERNARY AMMONIUM DISINFECTANTS

ABC Compounding Co., Oakcliff & Harwell Rds., Atlanta, Ga.
Aireactor Corp., 271 Madison Ave., N. Y. 16
Airkem, Inc., 241 E. 44th St., N. Y. 17
Antara Chemicals, 435 Hudson St., N. Y. 14
Armour Industrial Chem. Co., 110 N. Wacker Dr., Chicago
B & W Chem. Co., 25920 Belle Porte Ave., Harbor City, Calif.
Baird & McGuire, Inc., Holbrook, Mass.
Barlow Chem. Corp., Ossining, N. Y.
Barton Chemical Co., 1230 W. 46th St., Chicago 9
Bixon Chem. Corp., 1163 Southern Blvd., N. Y. 59
Britex Corp., 17 Lewis Wharf, Boston
Buckingham Wax Co., 51 Van Dam St., L. I. C. N. Y.
Chemical Concentrates, Ft. Washington, N. J.
Chem. Serv. of Balto., Howard & West St., Balto.
Chicago San. Prods. Co., 3100 S. Throop St., Chicago 8
Clarkson Laboratories, 1450 Ferry Ave., Camden, N. J.
Cowles Chemical Co., 7016 Euclid Ave., Cleveland 3
Davies-Young Soap Co., Dayton 1, O.
Dettelbach Chem. Corp., 4111 Peachtree Rd., Atlanta 19
Fine Organics, Inc., 205 Main St., Lodi, N. J.
Fleetwood Prods. Co., 509 5th Ave., N. Y. 17
Franklin Research, 5134 Lancaster Ave., Phila.
Frontier Chem. Prods., 119 E. Soper St., St. Louis 11
Fuld Bros., 702 S. Wolfe St., Baltimore
Geigy Industrial Chemicals, Ardsley, N. Y.
James Good, Inc., 2107 Susquehanna Ave., Phila. 25
Harley Soap Co., Pearce & Orthodox Sts., Phila. 37
R. M. Hollingshead Corp., Camden, N. J.
Hysan Products Co., 900 W. 38th Place, Chicago
Intex Chem. Corp., 167 Main St., Lodi, N. J.
Klix Chem. Co., 551 Railroad Ave., South San Francisco, Calif.
M. Michel & Co., 90 Broad St., N. Y. 4
Midland Laboratories, Dubuque, Iowa
Nalco Chem. Co., 6216 W. 66 Pl., Chicago
National Chem. Labs., 825 Lombard St., Phila.
National Milling & Chem. Co., 4601 Flat Rock Rd., Phila. 27
Onyx Chemical Corp., Warren & Morris Sts., Jersey City 2, N. J.
Peck's Prods. Co., 610 E. Clarence Ave., St. Louis
Puro Co., 2801 Locust St., St. Louis 3
Refined Prods. Co., 624 Schuyler Ave., Lyndhurst, N. J.
Reily Chem. Co., Industrial Prods. Div., P. O. Box 98, New Orleans, La.
Rochester Sanitary Prods. Co., 846 Exchange St., Rochester, N. Y.
Rohm & Haas Co., 222 W. Washington Sq., Philadelphia
Sole Chem. Corp., 7740 S. Chicago Ave., Chicago 19
Southern Chemical Prods. Co., 170 Poplar St., Macon, Ga.
Stecker Chems., Inc., 45 N. Broad St., Ridgewood, N. J.
Sterwin Chemicals, Inc., 1450 Broadway, N. Y.
Surety Laboratories, 3946 Olive St., St. Louis 8
Tanatex Chem. Corp., Belleville Turnpike, Kearny, N. J.
Tex-ite Prods. Corp., 859 E. 43rd St., Brooklyn 10

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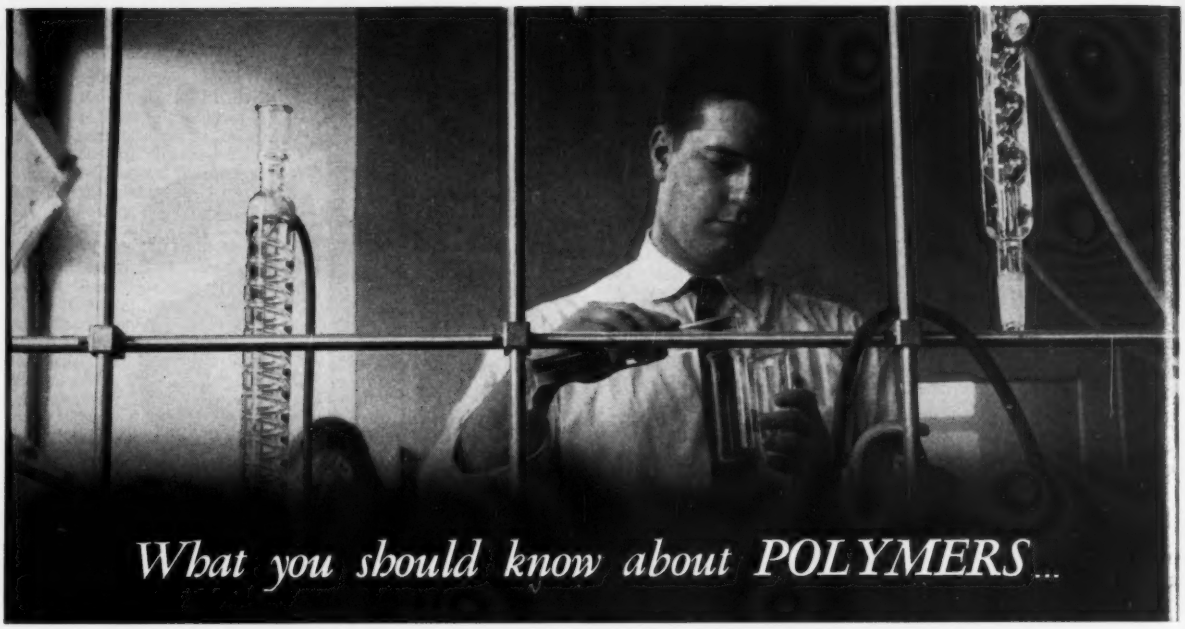

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As a series of styrene and acrylic based polymer and co-polymer emulsions, UBATOLS are known for their standout features in the areas of GLOSS and DURABILITY. The specific UBATOL you select for use in your formulation has several distinctions which make it unique. Let's examine their character **one** by **one.**

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U-2003 UBATOL has one third the particle size of U-2001 (for greater gloss) and an increased solids content from 36 to 40%.

U-2007 UBATOL is a milky white polymer which was developed to meet the demand for a clear, non-yellowing, floor polish. Because of its exceptional gloss and film clarity, U-2007 is primarily recommended for household floor polishes.

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U-3040 UBATOL . . . Its use will result in hard, tough films.

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U-3101 UBATOL . . . Unlike other polymers in the 3000 series, U-3101 UBATOL is a light colored, non-film forming acrylic which, in itself, can be compounded into a floor polish or used as an additive with U-4001 UBATOL. U-3101 combines toughness with built in removability and is recommended for buffable and household formulations.

U-4001 UBATOL stands apart from other U B S polymers. This floor polish component is unique because it combines the excellent gloss of the styrenes with the toughness and durability of the acrylates. U-4001 is rated tops for film clarity.

So, if you have yet to select the right UBATOL for your formulations, drop us a line. Samples, technical data and product consultation available on request.

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A Division of A. E. STALEY Manufacturing Company
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QUATERNARY AMMONIUM DISINFECTANTS (Cont'd.)

Thompson-Hayward Chem. Co., 2915 SW Blvd., Kansas City 8
Trio Chemical Wks., 341 Scholes St., Bklyn. 6
Uncle Sam Chem. Co., 573 W. 131st St., N. Y.
U. S. Sanitary Specialties Corp., 1001 S. California Ave., Chicago 12
James Varley & Sons, 1200 Switzer Ave., St. Louis
Virginia-Carolina Chem. Corp., Richmond 8, Va.
Witco Chem. Co., 122 E. 42 St., N. Y. 17
Wyandotte Chemicals Corp., J. B. Ford Div., Wyandotte, Mich.

RAT EXTERMINATING PRODUCTS

Barnett Chem. Prods. Co., 326 Lafayette Bldg., Phila. 6
California Spray-Chemical Corp., Richmond, Calif.
Chase Products Co., 20 St. & Gardner Rd., Broadview, Ill.
Chemical Insecticide Corp., 30 Whitman Ave., Metuchen, N. J.
Chem. Service of Balto., Howard & West Sts., Balto.
Chicago Sanitary Prods. Co., 3100 S. Throop St., Chicago
Exterminating Materials Co., 555 W. 22nd St., N. Y.
Fuld Bros., 702 S. Wolfe St., Baltimore
Geigy Agri. Chems., Ardsley, N. Y.
Hub States Chems. & Equipment, 1255 N. Windsor St., Indianapolis
Kemiko Mfg. Co., 500 Chancellor Ave., Irvington, N. J.
O. E. Linck Co., 51 James St., Montclair, N. J.
McLaughlin, Gormley, King Co., 1715 S.E. 5th St., Minneapolis
Morton Chem. Co., 110 N. Wacker Dr., Chicago 6
S. B. Penick & Co., 100 Church St., N. Y. C.
Prentiss Drug & Chem. Co., 101 W. 31st St., N. Y. 1
Private Brands, Inc., 300 S. 3rd St., Kansas City, Kan.
Puro Co., 2801 Locust St., St. Louis 3
Residex Corp., Clark, N. J.
Residex Corp., 1500 W. Elizabeth Ave., Linden, N. J.
Sennewald Drug Co., 2723 Chouteau Ave., St. Louis
Tex-ite Prods. Corp., 859 E. 43 St., Brooklyn
Thompson-Hayward Chem. Co., 2915 SW Blvd., Kansas City 8
Uncle Sam Chemical Co., 573 W. 131st St., N. Y. C.
United-Heckathorn, 600 S. 4 St., Richmond, Calif.
U. S. Sanitary Specialties Corp., 1001 S. California Ave., Chicago 12
York Chem. Co., 23 Dean St., Bklyn. 1

RED OIL (Oleic Acid)

Acme Hardesty Co., 60 E. 42nd St., N. Y.
Armour Industrial Chemical Co., 110 N. Wacker Dr., Chicago
Capital City Prods. Co., 525 W. 1st St., Columbus 16, O.
Darling & Co., 4201 S. Ashland Ave., Chicago
E. F. Drew & Co., 15 E. 26 St., N. Y. 10
Eastern Industries, Ridgefield, N. J.
Emery Industries, Carew Tower, Cincinnati
Fine Organics, Inc., 205 Main St., Lodi, N. J.
A. Gross & Co., 295 Madison Ave., N. Y.
Harchem Div., 25 Main St., Belleville 9, N. J.
Kamen Soap Prods. Co., 5-22 50 Ave., L. I. C. 1, N. Y.
M. Michel & Co., 90 Broad St., N. Y. 4
Robeco Chemicals, Inc., 23 E. 26th St., N. Y. 10
Swift & Co., Hammond, Ind.
Jos. Turner & Co., Ridgefield, N. J.
Vegetable Oil Prods., 5568 E. 61 St., Los Angeles
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13
Wilson-Martin Div., Snyder & Swanson, Phila.
Woburn Chem. Corp., 1200 Harrison Ave., Kearny, N. J.

REODORANTS (see Masking Compounds)

REPELLENTS (see Dog Repellents; Insect Repellents)

RESIN SOLUTIONS (see Polymer Emulsions and Solutions)

RESINS, NATURAL (see Gums)

RESINS, SYNTHETIC, emulsion polish
(see also Polymer Emulsions and Solutions)

Allied Chem. Corp., Plastics Div., 40 Rector St., N. Y.
Durez Plastics Division, 1957 Walck Rd., N. Tonawanda, N. Y.
Eastman Chemical Prods., Kingsport, Tenn.
Food Machy. & Chem. Corp., 161 E. 42 St., N. Y. 17
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Rozilda Laboratories, 44-18 Purvis St., L. I. C., N. Y.
Tex-ite Prods. Corp., 859 E. 43rd St., Brooklyn
Witco Chem. Co., 122 E. 42nd St., N. Y.

SHAVING CREAM (soap and Brushless)

Chicago Sanitary Prods. Co., 3100 S. Throop St., Chicago 8
Davies-Young Soap Co., Dayton 1, O.
Lightfoot Co., 380 Madison Ave., N. Y. C.
Old Empire, Inc., Mt. Prospect & Verona Ave., Newark, N. J.
W. T. Rawleigh Co., Freeport, Ill.
Schmidt Soap Products Co., 236 W. North Ave., Chicago
John T. Stanley Co., 642 W. 30th St., N. Y.

SHAVING CREAM BASE

Armour & Co., 1355 W. 31 St., Chicago
Frontier Chem. Prods., Inc., 119 E. Soper St., St. Louis
Miranol Chemical Co., 277 Coit St., Irvington, N. J.
Refined Prods Corp., 624 Schuyler Ave., Lyndhurst, N. J.
Schmidt Soap Products Co., 236 W. North Ave., Chicago
John T. Stanley Co., 642 W. 30th St., N. Y.
Swift & Co., Chicago
Van Dyk & Co., Belleville 9, N. J.

SHEETING FOR PACKAGING (see Polyethylene Sheeting; Transparent Films)

SHELLAC

Acme Shellac Prods. Co., 108 Blanchard St., Newark, N. J.
Bradshaw Praeger & Co., 3248 W. 47th Place, Chicago

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TO

SOAP & CHEMICAL SPECIALTIES

MONTHLY ISSUES

For 1960, 1959, 1958

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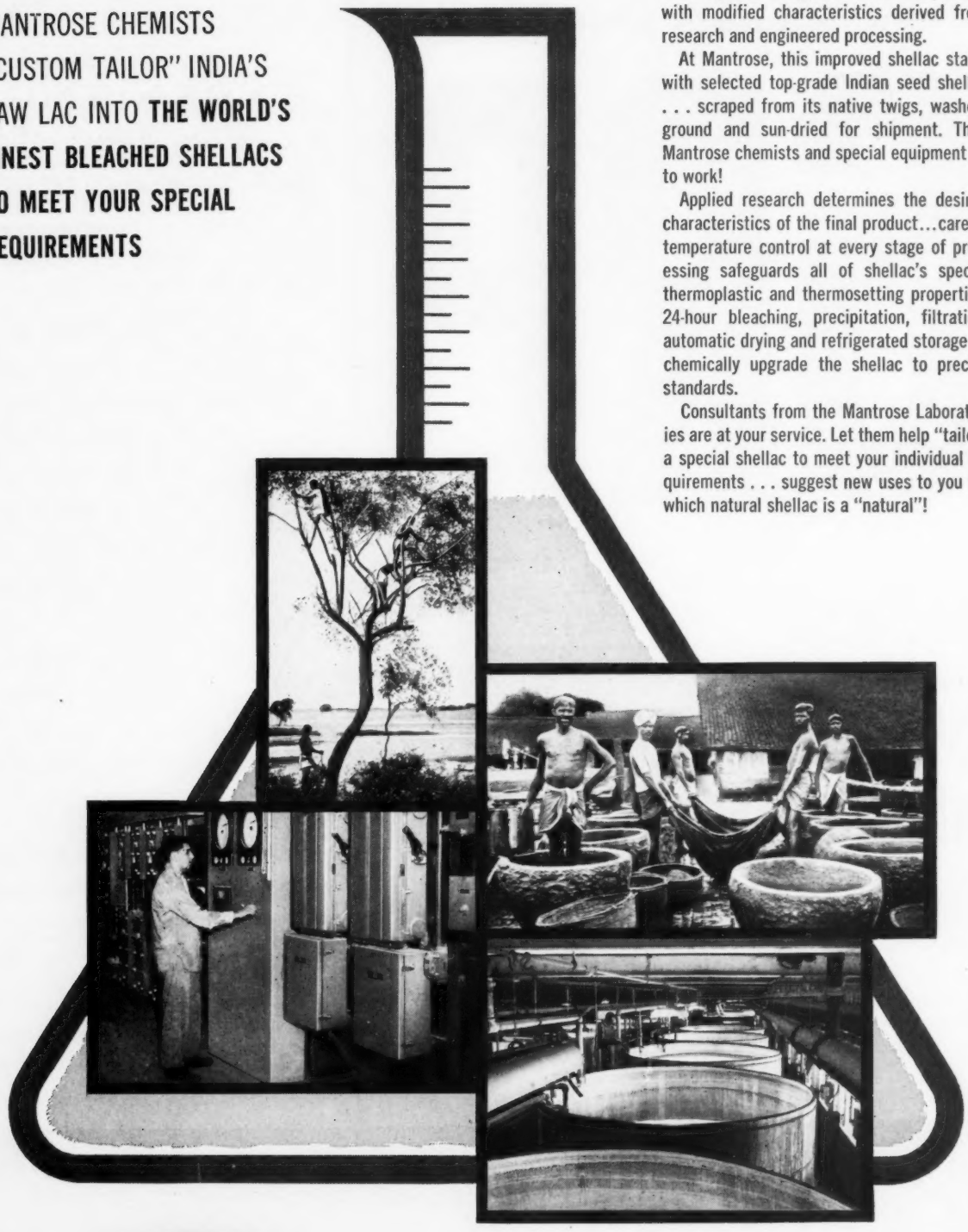

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Eagle-Picher Co., Cincinnati 1, (Diatomaceous)
Johns-Manville Prods. Corp., 22 E. 40th St., N. Y.
Robeco Chemicals, Inc., 25 E. 26th St., N. Y. 10
Tamms Industries, Inc., 228 N. LaSalle St., Chicago
Charles A. Wagner Co., 4455 N. 6th St., Phila. 23
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Witco Chemical Co., 122 E. 42nd St., N. Y.

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Girdler Process Equipment Div., Louisville, Ky.
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Meccaniche Moderne, Coro Sempione 51, Busto Arsizio, Italy
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Sharples Corp., 23rd & Westmoreland Sts., Phila. 40
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Foster D. Snell, 29 W. 15th St., N. Y. 11
Wurster & Sanger, Inc., 5201 S. Kenwood Ave., Chgo.

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Armour & Co., 1355 W. 31st St., Chicago
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Hewitt Soap Co., 333 Linden Ave., Dayton, O.
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John T. Stanley Co., 642 W. 30th St., N. Y.
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Baird & McGuire, Inc., Holbrook, Mass.
Bixon Chem. Corp., 1163 Southern Blvd., N. Y. 59
Chem. Service of Balto.. Howard & West Sts., Balto.
Chicago Sanitary Prods. Co., 3100 S. Throop St., Chicago
Colgate-Palmolive Co., 300 Park Ave., N. Y. 22
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Davies-Young Soap Co., Dayton, O.
Essential Chemicals Co., 5906 N. Port Washington Rd., Milwaukee
Franklin Research, 5134 Lancaster Ave., Phila.
Freesmeier Laboratories, 3661 Windsor Pl., St. Louis 13
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Harley Soap Co., Pearce & Orthodox Sts., Phila. 37.
Hewitt Soap Co., 333 Linden Ave., Dayton, O.
Hysan Prods. Co., 930 W. 38th Place, Chicago 9
Klix Chem. Co., 551 Railroad Ave., S. San Francisco
G. H. Packwood Mfg. Co., 1545 Tower Grove Ave., St. Louis
Peck's Prods. Co., 610 E. Clarence Ave., St. Louis
Piatt & Smillie Chemicals, 3419 Gratiot Ave., St. Louis
Purex Corp., 9300 Rayo Ave., South Gate, Calif.
Reily Chemical Co., P. O. Box 98, New Orleans, La.
Southern Chemical Prods. Co., 170 Poplar St., Macon, Ga.
John T. Stanley Co., 642 W. 30th St., N. Y.
Swift & Co., Chicago
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Uncle Sam Chem. Co., 575 W. 131st St., N. Y. 27
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James Varley & Sons, 1200 Switzer Ave., St. Louis 15

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Hewitt Soap Co., Dayton, O.
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Lockwood-Brackett Co., Waltham Station, Boston
Mem Co., 67 Irving Pl., N. Y. 3
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Peck's Prods. Co., 610 E. Clarence Ave., St. Louis
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Baums Castorine Co., 200 Matthew St., Rome, N. Y.
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Davies-Young Co., Dayton, O.
Essential Chemicals Co., 5906 N. Port Washington Rd., Milwaukee
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Haag Laboratories, Inc., 14000 S. Seeley Ave., Blue Island, Ill.
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Hewitt Soap Co., Dayton, O.
Higley Chem. Co., Dubuque, Iowa.
R. M. Hollingshead Corp., Camden, N. J.
Hysan Prods. Co., 936 W. 38th Place, Chicago
Klix Chem. Co., 551 Railroad Ave., S. San Francisco
Kranich Soap Co., 54 Richards St., Brooklyn
Midland Laboratories, 210 Jones St., Dubuque, Iowa
Old Empire, Inc., Mt. Prospect & Verona Ave., Newark, N. J.
Peck's Prods. Co., 610 S. Clarence Ave., St. Louis
Southern Chemical Prods. Co., 170 Poplar St., Macon, Ga.
John T. Stanley Co., 642 W. 30th St., N. Y.
Swift & Co., Chicago
Trio Chem. Wks., 341 Scholes St., Brooklyn
U. S. Sanitary Spec. Corp., 1001 S. California Blvd., Chicago 12
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East Coast Soap Corp., 89 Coffey St., Bklyn. 31
Essential Chemicals Co., 5906 N. Port Washington Rd., Milwaukee
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Swift & Co., Chicago
Tex-ite Prods. Corp., 859 E. 43rd St., Brooklyn 10
Theobald Industries, P. O. Box 72, Harrison, N. J.
Trio Chemical Wks., 341 Scholes St., Bklyn. 6
Ultra Chem. Wks., Inc., 2 Wood St., Paterson, N. J.
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Witco Chem. Co., 122 E. 42nd St., N. Y.

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Peck's Prods. Co., 610 E. Clarence Ave., St. Louis
Schaeffer Mfg. Co., 102 Barton St., St. Louis

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Concord Chem. Co., 205 S. 2nd St., Camden, N. J.
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Kamen Soap Prods. Co., 5-22 50 Ave., L.I.C., 1, N. Y.
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Swift & Co., Chicago

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Colgate-Palmolive Co., 300 Park Ave., N. Y.
Concord Chem. Co., 205 S. 2nd St., Camden, N. J.
Dameron Enterprises, 427 S. 20th St., Louisville, Ky.
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DL Products, Inc., 51 E. Market St., Buffalo, N. Y.
Emulso Corp., 301 Ellicott St., Buffalo, N. Y.
Essential Chemicals Co., 5906 N. Port Washington Rd., Milwaukee
Frontier Chem. Prods., 119 E. Soper St., St. Louis 11
Fuld Bros., 702 S. Wolfe St., Baltimore
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Procter & Gamble Dist. Co., Cincinnati
Quickee Prods. Inc., 141 Woodworth Ave., Yonkers, N. Y.
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S. & S. Soap Co., 815 E. 135 St., N. Y. 54
Southern Chemical Prods. Co., 170 Poplar St., Macon, Ga.
John T. Stanley Co., 642 W. 30th St., N. Y.
Sugar Beet Prods. Co., Saginaw, Mich.
Surety Laboratories, 3946 Olive St., St. Louis 8
Swift & Co., Chicago
Tex-ite Prods., 859 E. 34rd St., Brooklyn 10
Theobald Industries, P. O. Box 72, Harrison, N. J.
Trio Chem. Wks., 314 Scholes St., Bklyn.
Sprayway, Inc., 7638 Vincennes Ave., Chicago 20
U. S. Sanitary Spec. Corp., 1001 S. Calif., Chicago 12
Utility Co., 636 W. 44th St., N. Y.
Warsaw Chem. Co., Warsaw, Ind.
Roy Wilson Mfg. Co., 2541 Archer Ave., Chicago 8

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Armour & Co., 1355 W. 31st St., Chicago 9
B & W Chem. Co., 25920 Belle Porte Ave., Harbor City, Calif.
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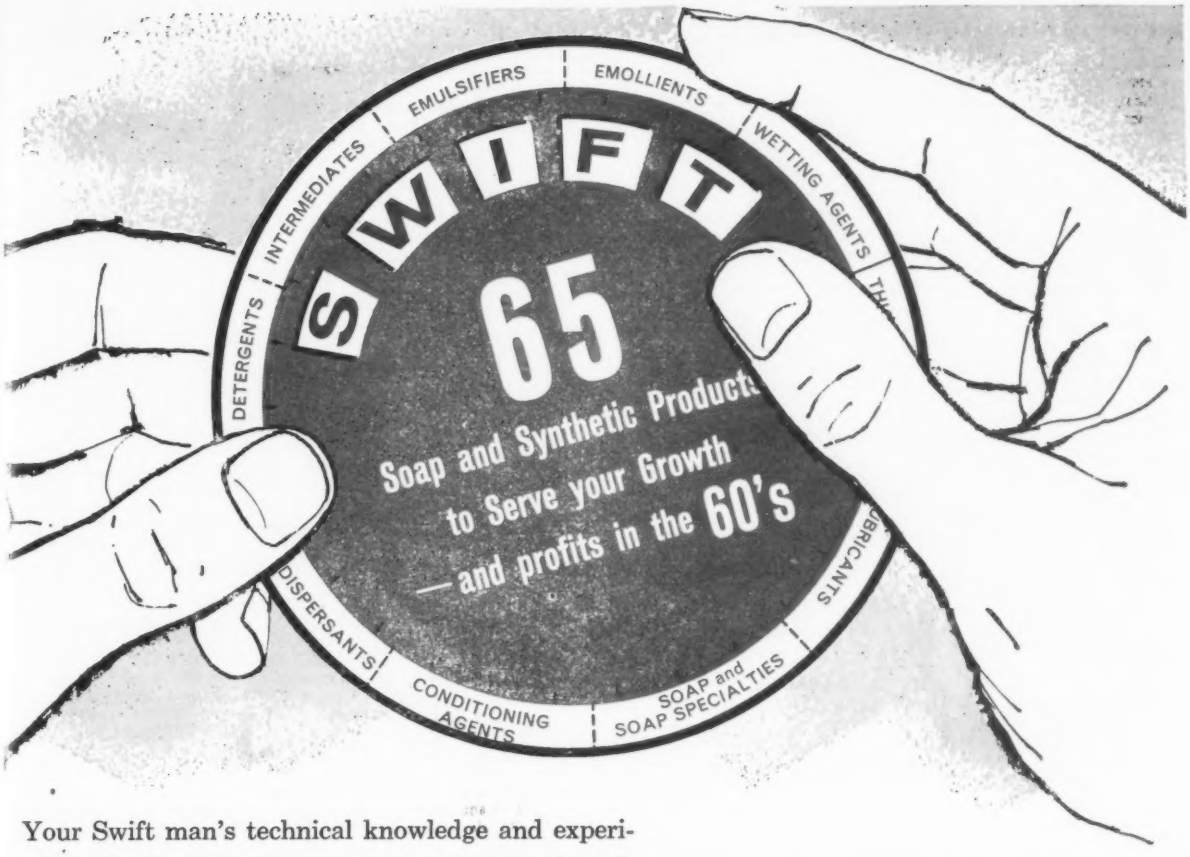

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Cleveland 2, Ohio

Swift & Co., Soap Dept.
1215 Harrison Ave.
Kearny, New Jersey

Swift & Co., Soap Dept.
3760 Jewel Ave.
Los Angeles 58, Calif.

Swift & Co., Soap Dept.
Girard Ave. Mkt.
9th Girard Ave.
Philadelphia 23, Pa.

Swift & Co., Soap Dept.
National Stock Yards
E. St. Louis, Ill.

Swift & Co., Soap Dept.
309 Anderson St.
N. S. Pittsburgh 12, Pa.

Swift & Co., General Soap Dept.
Union Stock Yards
Chicago 9, Illinois

Swift Canadian Co., Ltd.,
Soap Dept.
1960 St. Clair Ave., West
Toronto 9, Ontario, Canada

S-67R

SOAP (Bulk and Private Brand) HAND, POWDERED (Cont'd.)

Britex Corp., 17 Lewis Wharf, Boston
Capitol Soap Corp., 310 Colfax Ave., Clifton, N. J.
Chicago Sanitary Prod. Co., 3100 S. Throop St., Chicago 8
Concord Chem. Co., 205 S. 2nd St., Camden, N. J.
Dameron Enterprises, 4275 20th St., Louisville, Ky.
Dettelbach Chem. Corp., 4111 Peachtree Rd., Atlanta 19
DL Products, Inc., 51 E. Market St., Buffalo 4, N. Y.
Emulso Corp., 301 Ellicott St., Buffalo, N. Y.
Essential Chemicals, 5906 N. Port Washington Rd., Milwaukee
Fitzpatrick Bros., 1300 W. 32 Pl., Chicago 8
Frontier Chem. Prods., Inc., 119 E. Soper St., St. Louis
Gojer, Inc., Box 991, Akron, O.
Hammons Prods., Inc., 1141 W. Wildwood Ave., Ft. Wayne, Ind.
Hysan Prods Co., 936 W. 38th Place, Chicago
Jones-Hamilton Co., 455 Wells Ave., Newark, Calif.
Kamen Soap Prods. Co., 5-22 50 Ave., L. I. C. 1, N. Y.
Klix Chem. Co., 551 Railroad Ave., S. San Francisco
Kutol Products Co., 2817 Highland Ave., Cincinnati
Lightfoot Co., 380 Madison Ave., N. Y. C.
Mione Mfg. Co., Collingdale, Penna.
National Milling & Chemical Co., 4601 Flat Rock Rd., Phila. 27
New Jersey Chem. Co., 56 Park Ave., Lyndhurst, N. J.
G. H. Packwood Mfg. Co., 1545 Tower Grove Ave., St. Louis 10
Peck's Prods. Co., 610 E. Clarence Ave., St. Louis
Peerless Chem. Co., 1300-02 N. Fulton Ave., Baltimore
Procter & Gamble Dist. Co., Cincinnati
Puro Co., 2801 Locust St., St. Louis 3
Quickee Prods., Inc., 141 Woodworth Ave., Yonkers, N. Y.
S. & S. Soap Co., 815 E. 135 St., N. Y. 54
I. Schneid, Inc., 765 Trabert Ave., NW, Atlanta, Ga.
Southern Chemical Prods. Co., 170 Poplar St., Macon, Ga.
John T. Stanley Co., 642 W. 30th St., N. Y.
Sugar Beet Prods. Co., Saginaw, Mich.
Tex-ite Prods. Corp., 859 E. 43rd St., Brooklyn 10
Theobald Industries, P. O. Box 72, Harrison, N. J.
Trio Chem. Wks., 341 Scholes St., Bklyn.
The Utility Co., 636-642 W. 44th St., N. Y. 26
U. S. Borax & Chem. Corp., 50 Rockefeller Plaza, N. Y. 20
U. S. Sanitary Specialties Corp., 1001 S. California Ave., Chicago 12
Warren Soap Mfg. Co., Cambridge, Mass.
Warsaw Chem. Co., Warsaw, Ind.

SOAP (Bulk and Private Brand) LAUNDRY, CAKE

Albany Soap Corp., 46 Delaware Ave., Albany 3, N. Y.
Armour & Co., Chicago 9
Beach Soap Co., Lawrence, Mass.
Chicago Sanitary Prods. Co., 3100 S. Throop St., Chicago 8
Colgate-Palmolive Co., 300 Park Ave., N. Y. 22
Concord Chem. Co., 205 S. 2nd St., Camden, N. J.
East Coast Soap Corp., 89 Coffey St., Bklyn.
Essential Chemicals Co., 5906 N. Port Washington Rd., Milwaukee
Fels & Co., 73rd St. & Woodland Ave., Philadelphia
Fitzpatrick Bros., 1300 W. 32 St., Chicago 8
Hewitt Soap Co., 333 Linden Ave., Dayton, O.
Kamen Soap Prods. Co., 5-22 50 Ave., L.I.C., 1, N. Y.
Lightfoot Co., 380 Madison Ave., N. Y. C.
Long Island Soap Co., Meeker Ave. & Bridgewater St., Brooklyn
Los Angeles Soap Co., 617 E. 1st St., Los Angeles, Calif.
National Milling & Chem. Co., 4601 Flat Rock Rd., Phila.
North Coast Chem. & Soap Wks., Seattle, Wash.
Peck's Prods. Co., 610 E. Clarence Ave., St. Louis
Procter & Gamble Dist. Co., Cincinnati
Purex Corp., 9300 Rayo Ave., South Gate, Calif.
John T. Stanley Co., 642 W. 30th St.,N.Y.
Swift & Co., Union Stock Yards, Chicago
Warren Chem. Mfg. Inc., Norwood, Mass.

SOAP (Bulk and Private Brand) LAUNDRY, CHIP

Albany Soap Corp., 46 Delaware Ave., Albany 3, N. Y.
Armour & Co., Chicago 9
Beach Soap Co., Lawrence, Mass.
Chicago Sanitary Prods. Co., 3100 S. Throop St., Chicago 8
Colgate-Palmolive Co., 300 Park Ave., N. Y. 22
Concord Chem. Co., 205 S. 2nd St., Camden, N. J.
E. F. Drew & Co., 15 E. 26th St., N. Y. 10
Essential Chemicals Co., 5906 N. Port Washington Rd., Milwaukee
Fitzpatrick Bros., 1300 W. 32 St., Chicago 8
Hewitt Soap Co., 333 Linden Ave., Dayton, O.
Kamen Soap Prods. Co., 5-22 50 Ave., L.I.C., 1, N. Y.
Lever Bros. Co., 390 Park Ave., N. Y.
Lightfoot Co., 380 Madison Ave., N. Y. C.
Long Island Soap Co., Meeker Ave. & Bridgewater St., Brooklyn
Los Angeles Soap Co., 617 E. 1st St., Los Angeles, Calif.

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National Milling & Chem. Co., 4601 Flat Rock Rd., Phila.
National Soap Co., 357 South 25th St., Tacoma, Wash.
North Coast Chem. & Soap Wks., Seattle, Wash.
Original Bradford Soap Wks., West Warwick, R. I.
Procter & Gamble Dist. Co., Cincinnati
John T. Stanley Co., 642 W. 30th St.,N.Y.
Swift & Co., Union Stock Yards, Chicago
Theobald Industries, P. O. Box 72, Harrison, N. J.
U. S. Borax & Chem. Corp., 50 Rockefeller Plaza, N. Y.
Warren Chem. Mfg. Inc., Norwood, Mass.

SOAP (Bulk and Private Brand) LAUNDRY, POWDERED AND GRANULATED

ABC Compounding Co., Oakcliffe & Harwell Rds., Atlanta, Ga.
Albany Soap Corp., 46 Delaware Ave., Albany 3, N. Y.
Armour & Co., Chicago 9
B & W Chem. Co., 25920 Belle Porte Ave., Harbor City, Calif.
Beach Soap Co., Lawrence, Mass.
Britex Corp., 17 Lewis Wharf, Boston
Chicago Sanitary Prods. Co., 3100 S. Throop St., Chicago 8
Clifton Chem. Co., 150 Nassau St., New York
Colgate-Palmolive Co., 300 Park Ave., N. Y. 22
Concord Chem. Co., 205 S. 2nd St., Camden, N. J.
Cowles Chem. Co., 7016 Euclid Ave., Cleveland 3
Dettelbach Chem. Corp., 4111 Peachtree Rd., Atlanta 19
Essential Chemicals Co., 5906 N. Port Washington Rd., Milwaukee
Fitzpatrick Bros., 1300 W. 32 St., Chicago 8
Hewitt Soap Co., 333 Linden Ave., Dayton, O.
Kamen Soap Prods. Co., 5-22 50 Ave., L.I.C., 1, N. Y.
Klix Chem. Co., 551 Railroad Ave., S. San Francisco
Lever Bros. Co., 390 Park Ave., N. Y.
Los Angeles Soap Co., 617 E. 1st St., Los Angeles, Calif.
Miranol Chemical Co., 277 Coit St., Irvington, N. J.
National Milling & Chem. Co., 4601 Flat Rock Rd., Phila.
National Soap Co., 357 South 25th St., Tacoma, Wash.
North Coast Chem. & Soap Wks., Seattle, Wash.
Original Bradford Soap Wks,, West Warwick, R. I.
G. H. Packwood Mfg. Co., 1545 Tower Grove Ave., St. Louis 10
Procter & Gamble Dist. Co., Cincinnati
Purex Corp., Industrial Div., P. O. Box 9686, Philadelphia
Puro Co., 2801 Locust St., St. Louis 3
Southern Chemical Prods. Co., 170 Poplar St., Macon, Ga.
John T. Stanley Co., 642 W. 30th St., N. Y.
Swift & Co., Union Stock Yards, Chicago
Theobald Industries, P. O. Box 72, Harrison, N. J.
U. S. Borax & Chem. Corp., 50 Rockefeller Plaza, N. Y.
Warren Chem. Mfg. Inc., Norwood, Mass.

SOAP (Bulk and Private Brand) MEDICINAL, CAKE

Armour & Co., 1355 W. 31st St., Chicago
Hewitt Soap Co., 333 Linden Ave., Dayton, O.
John T. Stanley Co., 642 W. 30th St., N. Y.
Swift & Co., Chicago

SOAP (Bulk and Private Brand) MOTTLED

Armour & Co., 1355 W. 31st St., Chicago
Hewitt Soap Co., 333 Linden Ave., Dayton, O.
Lightfoot Co., 380 Madison Ave., N. Y. C.
Los Angeles Soap Co., 617 E. 1st St., Los Angeles
Peck's Prods. Co., 610 E. Clarence Ave., St. Louis
John T. Stanley Co., 642 W. 30th St., N. Y.

SOAP (Bulk and Private Brand) NOVELTY

Armour & Co., 1355 W. 31st St., Chicago
Chicago Sanitary Prod. Co., 3100 S. Throop St., Chicago 8
Hewitt Soap Co., 333 Linden Ave., Dayton, O.
Lightfoot Co., 380 Madison Ave., N. Y. C.
Mem Co., 67 Irving Pl., N. Y. 3
Peck's Products Co., 610 E. Clarence Ave., St. Louis
John T. Stanley Co., 642 W. 30th St., N. Y.

SOAP (Bulk and Private Brand) POTASH (Soft Soaps, Liquid Soaps, Floor Scrub Soaps, Shampoo Soaps, etc.)

ABC Compounding Co., Oakcliff & Harwell Rds., Atlanta, Ga.
Armour & Co., 1355 W. 31st. St., Chicago 9
B & W Chem. Co., 25920 Belle Porte Ave., Harbor City, Calif.
Baird & McGuire, Inc., Holbrook, Mass.
Bixon Chem. Corp., 1163 Southern Blvd., N. Y. 59
Britex Corp., 17 Lewis Wharf, Boston
Buckingham Wax Co., 51-03 Van Dam St., L. I. City, N. Y.

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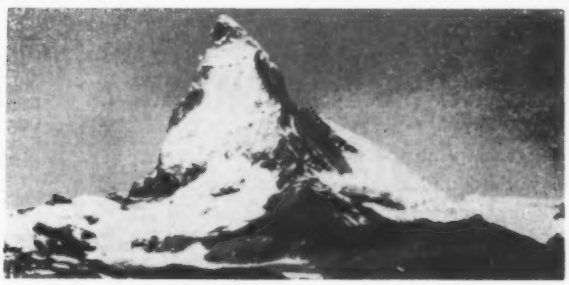

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SOAP (Bulk and Private Brand) POTASH (Cont'd.)

Chem. Service of Balto., Howard & West Sts., Balto.
Chicago Sanitary Prods. Co., 3100 S. Throop St., Chicago 8
Colgate-Palmolive Co., 300 Park Ave., N. Y.
Concord Chem. Co., 205 S. 2nd St., Camden, N. J.
Davies-Young Soap Co., Dayton, Ohio
Dettelbach Chem. Corp., 4111 Peachtree Rd., Atlanta 19
Essential Chemicals, 5906 N. Port Washington Rd., Milwaukee
Fine Organics, Inc., 205 Main St., Lodi, N. J.
Fuld Bros., 702 S. Wolfe St., Baltimore
James Good, Inc., 2107 Susquehanna Ave., Phila.
Haag Laboratories, Inc., 14000 S. Seeley Ave., Blue Island, Ill.
Harley Soap Co., Pierce & Orthodox Sts., Philadelphia
Hewitt Soap Co., 333 Linden Ave., Dayton, O.
Higley Chemical Co., Dubuque, Iowa
R. M. Hollingshead Corp., Camden, N. J.
Hysan Prods. Co., 930 W. 38th Pl., Chicago
Kamen Soap Prods. Co., 5-22 50 Ave., L. I. C. 1, N. Y.
Klix Chem. Co., 551 Railroad Ave., S. San Francisco
Kranich Soap Co., 54 Richards St., Brooklyn
Los Angeles Soap Co., 617 E. 1st St., Los Angeles, Calif.
McAleer Mfg. Corp., 101 S. Waterman Ave., Detroit
Midland Labs., Dubuque, Ia.
Mione Mfg. Co., Collingdale, Pa.
National Chem. Labs., 825 Lombard St., Phila.
National Milling & Chemical Co., 4601 Flat Rock Rd., Phila. 27
Nopco Chemical Co., 60 Park Pl., Newark, N. J.
North Coast Chem. & Soap Wks., Seattle, Wash.
N. Y. Soap Co., 258 Third St., Brooklyn
Oil Specialties & Refining Co., 18 Bridge St., Bklyn.
G. H. Packwood Mfg. Co., 1545 Tower Gate Ave., St. Louis, Mo.
Peck's Prods. Co., 610 E. Clarence Ave., St. Louis
Peerless Chem. Co., 1300-02 N. Fulton Ave., Baltimore
Perrow Chem. Co., Hurt, Va.
Piatt & Smillie Chemicals, 3419 Gratiot St., St. Louis
Reily Chemical Co., P. O. Box 98, New Orleans, La.
Sanders Chem. Co., 2205 N. American St., Phila. 33
I. Schneid, Inc., 765 Trabert Ave., N. W. Atlanta, Ga.
Southern Chemical Prods. Co., 170 Poplar St., Macon, Ga.
John T. Stanley Co., 642 W. 30th St., N. Y.
Swift & Co., Chicago 9
Tex-ite Prods. Corp., 859 E. 43rd St., Brooklyn 10
Thompson-Hayward Chemical Co., 2915 S.W. Blvd., Kansas City
Trio Chem. Wks., 341 Scholes St., Bklyn.
Uncle Sam Chem. Co., 573 W. 131st St., N. Y.
U. S. Sanitary Specialties Corp., 1001 S. California Ave., Chicago 12
Roy Wilson Mfg. Co., 2541 Archer Ave., Chicago 8
Wolf Soap Co., 254 Sheffield Ave., Bklyn.

SOAP (Bulk and Private Brand) POWDERED
(White neutral powdered soap, powdered castile soap, etc., 95-99% anhydrous soap. Do not confuse with Soap Powders.)

Armour & Co., 1355 W. 31st St., Chicago 9
Britex Corp., 17 Lewis Wharf, Boston
Chicago Sanitary Prods. Co., 3100 S. Throop St., Chicago 8
Colgate-Palmolive Co., 300 Park Ave., N. Y. 22
Concord Chem. Co., 205 S. 2nd St., Camden, N. J.
Hewitt Soap Co., 333 Linden Ave., Dayton, O.
Kamen Soap Prods. Co., 5-22 50 Ave., L. I. C. 1, N. Y.
Kranich Soap Co., 54 Richards St., Brooklyn, N. Y.
Lever Bros., Co., 390 Park Ave., N. Y. 22
Mione Mfg. Co., Collingdale, Pa.
National Milling & Chem. Co., 4601 Flat Rock Rd., Phila.
G. H. Packwood Mfg. Co., 1545 Tower Grove Ave., St. Louis 10
Peck's Prods. Co., 610 E. Clarence Ave., St. Louis
Prentiss Drug & Chem. Co., 101 W. 31 St., N. Y.
John T. Stanley Co., 642 W. 30th St., N. Y.
Swift & Co., Chicago 9
U. S. Borax & Chem. Corp., 50 Rockefeller Plaza, N. Y.
Warren Chem. Mfg., Inc., Norwood, Mass.
Allen B. Wrisley Co., 6801 W. 65th St., Chicago

SOAP (Bulk and Private Brand) POWDERS
(Do not confuse with pure powdered soaps)

ABC Compounding Co., Oakcliff & Harwell Rds., Atlanta, Ga.
Armour & Co., 1355 W. 31st St., Chicago 9
B & W Chem. Co., 25920 Belle Porte Ave., Harbor City, Calif.
Beach Soap Co., Lawrence, Mass.
Britex Corp., 17 Lewis Wharf, Boston
Concord Chem. Co., 205 S. 2nd St., Camden, N. J.
Chicago Sanitary Prods. Corp., 3100 S. Throop St., Chicago 8
Cowles Chemical Co., 7016 Euclid Ave., Cleveland
Dettelbach Chem. Corp., 4111 Peachtree Rd., Atlanta 19

East Coast Soap Corp., 89 Coffey St., Bklyn: 31
Essential Chems. Co., 5906 N. Port Washington Ave., Milwaukee
Fitzpatrick Bros., 1300 W. 32 Pl., Chicago 8
Frontier Chem. Prods., Inc., 119 E. Soper St., St. Louis
Help, Inc., 122 W. Kinzie St., Chicago
R. M. Hollingshead Corp., Camden, N. J.
Hysan Prods. Co., 930 W. 38th Place, Chicago 9
"J" Chemical Works, 602 W. 37th St., N. Y. C. 18
Kamen Soap Prods. Co., 5-22 50 Ave., L. I. C. 1, N. Y.
Klix Chem. Co., 551 Railroad, S. San Francisco
H. Kohnstamm & Co., 161 6th Ave., N. Y. C.
Lever Bros. Co., 390 Park Ave., N. Y.
Los Angeles Soap Co., 617 E. First St., Los Angeles
M. Michel & Co., 90 Broad St., N. Y. 4
Midland Laboratories, Dubuque, Iowa
Miranol Chem. Co., 277 Coit St., Irvington, N. J.
National Southern Products, Tuscaloosa, Ala.
National Milling & Chem. Co., 4601 Flat Rock Rd., Phila. 27
Nopco Chemical Co., 60 Park Pl., Newark 1, N. J.
North Coast Soap & Chem. Wks., Seattle, Wash.
G. H. Packwood Mfg. Co., 1545 Tower Grove Ave., St. Louis 10
Peck's Prods. Co., 610 E. Clarence Ave., St. Louis
Procter & Gamble Distributing Co., Cincinnati
S. & S. Soap Co., 815 E. 135 St., N. Y. 54
Southern Chemical Prods. Co., 170 Poplar St., Macon, Ga.
John T. Stanley Co., 642 W. 30th St., N. Y.
Swift & Co., Chicago
Warren Chem. Mfg., Inc., Norwood, Mass.

SOAP (Bulk and Private Brand) SADDLE

Chem. Service of Balto., Howard & West Sts., Balto.
Davies-Young Soap Co., Dayton, O.
James Good, Inc., 2107 Susquehanna Ave., Phila.
Harley Soap Co., Pierce & Orthodox Sts., Philadelphia
Hewitt Soap Co., Dayton, O.
R. M. Hollingshead Corp., Camden, N. J.
Hysan Products Co., 930 W. 38th Place, Chicago
Peck's Prods. Co., 610 E. Clarence Ave., St. Louis
John T. Stanley Co., 642 W. 30th St., N. Y.
Windsor Wax Co., Inc., 611 Newark St., Hoboken, N. J.

SOAP (Bulk and Private Brand) SALT WATER

Britex Corp., 17 Lewis Wharf, Boston
Chicago Sanitary Prods. Co., 3100 S. Throop St., Chicago 8
Colgate-Palmolive Co., 300 Park Ave., N. Y. 22
Concord Chem. Co., 205 S. 2nd St., Camden, N. J.
Essential Chemical Co., 5906 N. Port Washington Rd., Milwaukee
James Good, Inc., 2107 Susquehanna Ave., Phila.
Harley Soap Co., Pierce & Orthodox Sts., Phila.
Hewitt Soap Co., 333 Linden Ave., Dayton, O.
Higley Chemical Co., Dubuque, Iowa
Kamen Soap Prods. Co., 5-22 50 Ave., L. I. C. 1, N. Y.
Los Angeles Soap Co., 617 E. 1st St., Los Angeles, Calif.
North Coast Soap & Chem. Works, Seattle, Wash.
Peck's Prods. Co., 610 E. Clarence Ave., St. Louis
Purex Corp., 9300 Rayo Ave., South Gate, Calif.
John T. Stanley Co., 642 W. 30th St., N. Y.
Warren Chem. Mfg. Inc., Norwood, Mass.

SOAP (Bulk and Private Brand) SCOURING, BARS

Chicago Sanitary Prods. Co., 3100 S. Throop St., Chicago 8
Concord Chem. Co., 205 E. 2nd St., Camden, N. J.
James Good, Inc., 2107 E. Susquehanna Ave., Phila.
Hewitt Soap Co., 333 Linden Ave., Dayton, O.
Hunnewell Soap Co., 114 W. 2nd St., Cincinnati
Kamen Soap Prods. Co., 5-22 50 Ave., L. I. C. 1, N. Y.
National Soap Co., P. O. Box 1631, Tacoma, Wash.
Procter & Gamble Co., Cincinnati, O.
John T. Stanley Co., 642 W. 30th St., N. Y.
Swift & Co., Chicago
Warren Chem. Mfg. Inc., Norwood, Mass.

SOAP (Bulk and Private Brand) SCOURING, POWDER

ABC Compounding Co., Oakcliff & Harwell Rds., Atlanta, Ga.
Atlantic Refining Co., 260 S. Broad St., Philadelphia
B. T. Babbitt, Inc., 625 Madison Ave., N. Y.
Baird & McGuire, Inc., Holbrook, Mass.
Britex Corp., 17-18 Lewis Wharf, Boston 10
Capitol Soap Corp., 310 Colfax Ave., Clifton, N. J.
Chicago Sanitary Prods. Co., 3100 S. Throop St., Chicago 8
Colgate-Palomolive Co., 300 Park Ave., N. Y. 22
Concord Chem. Co., 205 E. 2nd St., Camden, N. J.

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SOAP (Bulk and Private Brand) SCOURING, POWDER (Cont'd.)

Fitzpatrick Bros., 1300 W. 32nd St., Chicago 8
Hewitt Soap Co., Dayton, O.
Hysan Products Co., 930 W. 38th Place, Chicago
"J" Chemical Works, 602 W. 37th St., N. Y. 18
Klix Chem. Co., 551 Railroad Ave., S. San Francisco
Los Angeles Soap Co., 617 E. First St., Los Angeles
National Milling & Chem. Co., 4601 Flat Rock Rd., Phila.
G. H. Packwood Mfg. Co., 1545 Tower Grove Ave., St. Louis, Mo.
Pal Products Mfg. Corp., 276 Warren St., Jersey City, N. J.
Peck's Prods. Co., 610 E. Clarence Ave., St. Louis
Procter & Gamble Dist. Co., Cincinnati
Purex Corp., 9300 Ravo Ave., South Gate, Calif.
Puro Co., 2801 Locust St., St. Louis 3
S. & S. Soap Co., 815 E. 135 St., N. Y. 54
Southern Chemical Prods. Co., 170 Poplar St., Macon, Ga.
John T. Stanley Co., 642 W. 30th St., N. Y.
Swift & Co., Chicago
Tex-ite Prods. Corp., 859 E. 43rd St., Brooklyn 10
Virginia-Carolina Chem. Corp., Richmond 8, Va.

SOAP (Bulk and Private Brand) TEXTILE

ABC Compounding Co., Oakcliff & Harwell Rds., Atlanta, Ga.
American Alcolac Corp., 3440 Fairfield Rd., Baltimore
Armour & Co., 1355 W. 31st St., Chicago 9
Atlas Powder Co., Wilmington, Dela.
B & W Chem. Co., 25920 Belle Porte, Harbor City, Calif.
Barlow Chem. Corp., Ossining, N. Y.
Beach Soap Co., Lawrence, Mass.
Chem. Service Co. of Baltimore, Howard & West Sts., Baltimore
Chicago Sanitary Prods. Co., 3100 S. Throop St., Chicago
Colgate-Palmolive Co., 300 Park Ave., N. Y. 22
Concord Chem. Co., 205 S. 2 St., Camden, N. J.
Continental Chem. Co., 195 21 Ave., Paterson, N. J.
E. F. Drew & Co., 15 E. 26 St., N. Y. 10
Emkay Chem. Co., 319 2nd St., Elizabeth, N. J.
Fiber Chem. Corp., Matawan, N. J.
Finetex, Inc., 418 Falmouth Ave., East Paterson, N. J.
Kamen Soap Prods. Co., 5-22 50 Ave., L. I. C. 1, N. Y.
Kearny Mfg. Co., Kearny, N. J.
H. Kohnstamm & Co., 161 6th Ave., N. Y. C.
Laurel Soap Mfg. Co., Tioga St., Phila.
Long Island Soap Co., 29 Bridgewater St., Brooklyn
Los Angeles Soap Co., 61 7E. 1st St., Los Angeles, Calif.
Marchon Prods. Ltd., Whitehaven, Cumberland, England
National Milling & Chemical Co., 4601 Flat Rock Rd., Phila. 27
Nopco Chem. Co., 60 Park Pl., Newark 1, N. J.
Onyx Chemical Corp., Warren & Morris Sts., Jersey City, N. J.
Original Bradford Soap Wks., West Warwick, R. I.
Peck's Prods. Co., 610 E. Clarence Ave., St. Louis
Procter & Gamble Dist. Co., Cincinnati
Sandoz, Inc., 61 Van Dam St., N. Y.
John T. Stanley Co., 642 W. 30th St., N. Y.
Swift & Co., Chicago
Tanatex Chem. Corp., Belleville Turnpike, Kearny, N. J.
Tex-ite Prods. Corp., 859 E. 43 St., Bklyn. 10

SOAP (Bulk and Private Brand) TOILET

Armour & Co., 1355 W. 31st St., Chicago
Chicago Sanitary Prods. Co., 3100 S. Throop St., Chicago
Colgate-Palmolive Co., 300 Park Ave., N. Y. 22
Duveen Soap Corp., 36-14 35th St., Long Island City, N. Y.
Haag Labs., Inc., 14000 S. Seeley Ave., Blue Island, Ill.
Hewitt Soap Co., 333 Linden Ave., Dayton, O.
Kamen Soap Prods. Co., 5-22 50 Ave., L. I. C. 1, N. Y.
Lever Bros. Co., 390 Park Ave., N. Y.
Long Island Soap Co., 29 Bridgewater St., Brooklyn
Lightfoot Co., 380 Madison Ave., N. Y.
Los Angeles Soap Co., 617 E. 1st St., Los Angeles, Cal.
North Coast Soap & Chem. Wks., Seattle, Wash.
Procter & Gamble Co., Cincinnati
Purex Corp., 9300 Rayo Ave., South Gate, Calif.
Schmidt Soap Products Co., 236 W. North Ave., Chicago
John T. Stanley Co., 642 W. 30th St., N. Y.
Swift & Co., Chicago

SOAP (Bulk and Private Brand) TRIETHANOLAMINE

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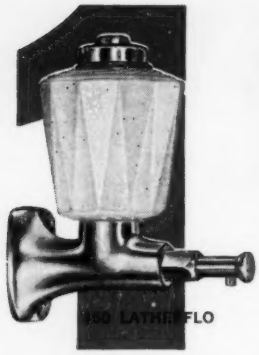

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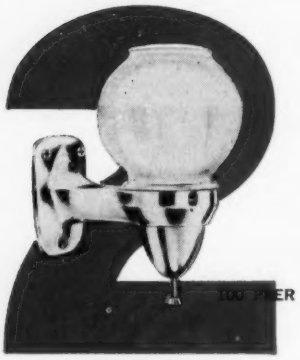

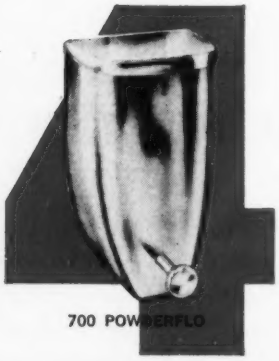

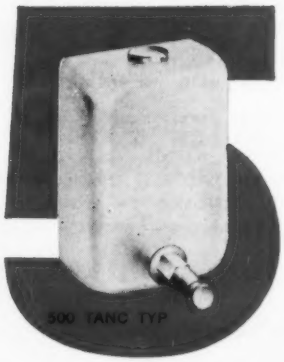

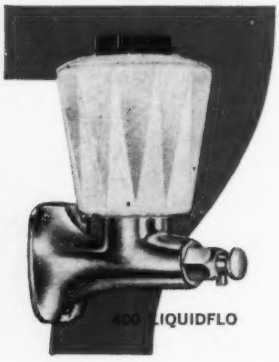

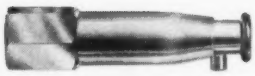

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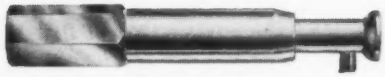

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Dominion Prods., Inc., 10-40 44 Dr., Long Island City
Finetex, Inc., 418 Falmouth Ave., East Paterson, N. J.
Fuld Bros., Inc., 702 S. Wolfe St., Baltimore
James Good, Inc., 2107 S. Susuehanna Ave., Phila.
Hodag Chem. Corp., 7274 N. Central Park, Chicago
Hysan Prods. Co., 930 W. 38th Place, Chicago 9
Kranich Soap Co., 54 Richards St., Bklyn.
Old Empire Inc., Mt. Prospect & Verona, Newark, N. J.
Peck's Prods. Co., 610 E. Clarence Ave., St. Louis
Southern Chemical Prods. Co., 170 Poplar St., Macon, Ga.
Surfact-Co., Box 114, Blue Island, Ill.
Trio Chemical Wks., 341 Scholes St., Bklyn. 6

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Concord Chem. Co., 205 S. 2 St., Camden, N. J.
R. M. Hollingshead Corp., Camden, N. J.
Nopco Chem. Co., 60 Park Pl., Newark, N. J.
North Coast Chem. & Soap Works, Seattle, Wash.
Peck's Prods. Co., 610 E. Clarence Ave., St. Louis

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Houchin Division, 300 Straight St., Paterson, N. J.
R. A. Jones & Co., Box 485, Cincinnati
G. Mazzoni, Busto Arsizio, Italy
Meccaniche Moderne, Corso Sempione 51, Busto Arsizio, Italy
Newman Tallow & Soap Machy. Co., 3601 S. Iron St., Chicago (Used)
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Dema Engineering Co., 10020 Big Bend Blvd., St. Louis
Donner & Co., 135 Henry Ave., Winnipeg, Canada
Imperial-Eastman Corp., 6300 W. Howard St., Chicago, Ill.
Lightfoot Co., 380 Madison Ave., N. Y. C.
Moore Bros. Co., 101 Warren St., N. Y.
G. H. Packwood Mfg. Co., 1545 Tower Grove Ave., St. Louis 10
Palmer Fixture Co., Waukesha, Wisc.
Sugar Beet Prods. Co., Saginaw, Mich.
Uncle Sam Chemical Co., 577 W. 131st St., N. Y. C.
U. S. Borax & Chem. Corp., 50 Rockefeller Plaza, N. Y.
U. S. Sanitary Specialties Corp., 1001 S. Calif. Ave., Chicago 12
Utility Co., 636 W. 44th St., N. Y. 36

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Chem. Service of Baltimore, Howard & West Sts., Baltimore
Dema Engineering Co., 10020 Big Bend Blvd., St. Louis
Economics Laboratory, Inc., Guardian Bldg., St. Paul
Fitzpatrick Bros., 1300 W. 32 Pl., Chicago 8
Fuld Bros., 702 S. Wolfe St., Baltimore
Hysan Products Co., 930 W. 38th Place, Chicago
Independent Specialties, 152 W. 75th St., Chicago
"J" Chemical Works, 602 W. 37th St., N. Y. 18
Miranol Chem. Co., 277 Coit St., Irvington, N. J.
G. H. Packwood Mfg. Co., 1545 Tower Grove Ave., St. Louis 10
Peck's Prods Co., 610 E. Clarence Ave., St. Louis 15
Redford Corp., 262 Saratoga Rd., Scotia, N. Y.
Theobald Industries, P. O. Box 72, Harrison, N. J.
James Varley & Sons, 1200 Switzer Ave., St. Louis 15

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Moore Bros. Co., 100 Warren St., N. Y.
U. S. Sanitary Specialties Corp., 1001 S. California Ave. ,Chicago
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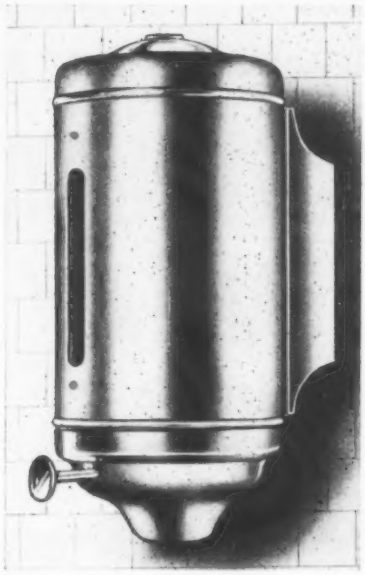

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Moore Bros. Co., 101 Warren St., N. Y.
Palmer Fixture Co., Waukesha, Wisc.
Spraying Systems Co., 3266 Randolph St., Bellwood, Ill.
Uncle Sam Chemical Co., 573 W. 131st St., N. Y. C.
U. S. Sanitary Specialties Corp., 1001 S. Calif. Ave., Chicago 12

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Bobrick Dispensers, Inc., 1216 Nostrand Ave., Bklyn. 25
Hysan Prods. Co., 930 W. 38th Place, Chicago 9
Moore Bros. Co., 101 Warren St., N. Y.
Palmer Fixture Co., Waukesha, Wisc.
Peck's Prods. Co., 610 E. Clarence Ave., St. Louis, Mo.
Uncle Sam Chemical Co., 573 W. 131st St., N. Y. C.
U. S. Sanitary Specialties Corp., 1001 S. Calif. Ave., Chicago 12

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Dema Engineering Co., 10020 Big Bend Blvd., St. Louis
DL Products, Inc., 51 E. Market St., Buffalo 4, N. Y.
Donner & Co., 135 Henry Ave., Winnipeg, Canada
Hammons Products, Inc., 1141 W. Wildwood Ave., Fort Wayne, Ind.
Hysan Prods. Co., 930 W. 38th Place, Chicago 9
Kutol Products, Inc., 2817 Highland Ave., Cincinnati
Mione Mfg. Co., Collingdale, Pa.
National Soap Dispenser Co., 230 W. 116 St., Los Angeles, Calif.
G. H. Packwood Mfg. Co., 1545 Tower Grove Ave., St. Louis 10
Palmer Fixture Co., Waukesha, Wisc.
Quickee Products, Inc., 141 Woodworth Ave., Yonkers, N. Y.
S & E Chemical Co., 1751 N. Harding Ave., Chicago
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Utility Co., 636 W. 44th St., N. Y. C. 36
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Fuld Bros., 702 Wolfe St., Baltimore
Hysan Products Co., 930 W. 38th Place, Chicago
Imperial-Eastman Corp., 6300 W. Howard St., Chicago, Ill.
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Palmer Fixture Co., Waukesha, Wisc.
Sugar Beet Prods. Co., Saginaw, Mich.
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Industrial Process Engineers, 8 Lister Ave., Newark 5, N. J.
J. M. Lehmann Co., 566 New York Ave., Lyndhurst, N. J.
G. Mazzoni, Busto Arsizio, Italy
Mecchaniche Moderne, Corso Sempione 51, Busto Arsizio, Italy
Newman Tallow & Soap Machy. Co., 3601 S. Iron St., Chicago (Used)
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Proctor & Schwartz, 7th St. & Tabor Rd., Philadelphia
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Mecchaniche Moderne, Corso Sempione 51, Busto Arsizio, Italy
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Houchin Division, 300 Straight St., Paterson, N. J.
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Littleford Bros., 443 E. Pearl St., Cincinnati
G. Mazzoni, Busto Arsizio, Italy
Meccaniche Moderne, Corso Sempione 51, Busto Arsizio, Italy
Newman Tallow & Soap Machy. Co., 3601 S. Iron St., Chicago (Used)
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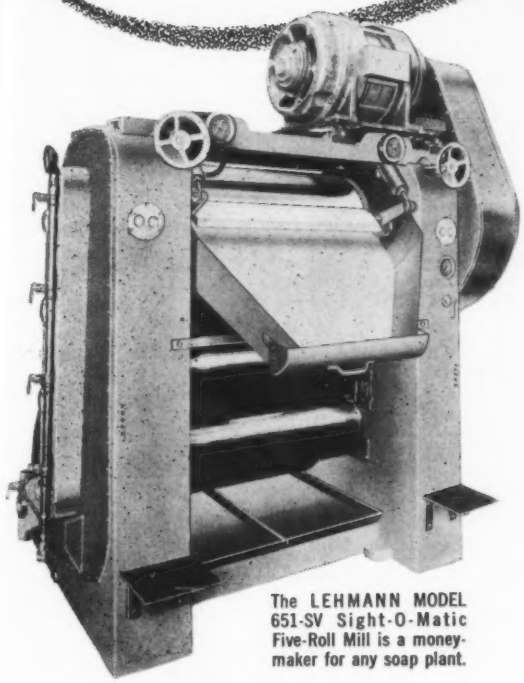

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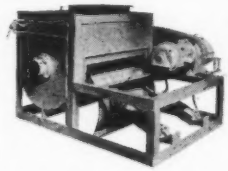
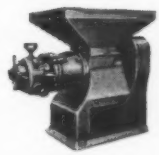
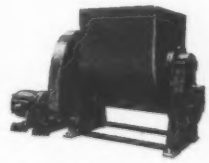


MODEL 40 G-B Bottom Dump Amalgamator.

MODEL 310-P Preliminary Plodder.



MODEL 310-F Finishing Plodder.



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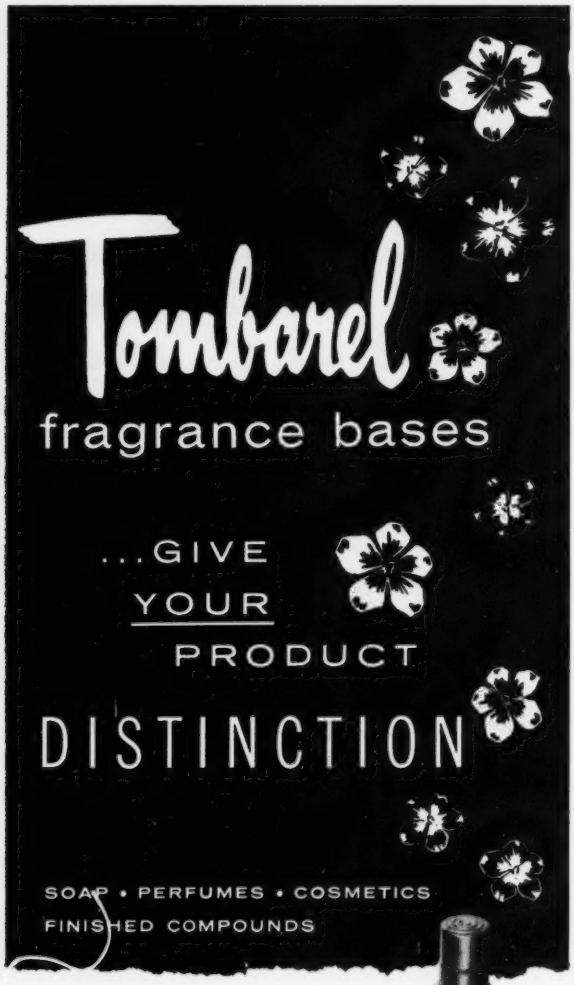

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Henry Simon Ltd., Cheadle Heath, Stockport, England
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Kent Mach. Wks., 37 Gold St., Bklyn. 1
J. M. Lehmann Co., 566 New York Ave., Lyndhurst, N. J.
G. Mazzoni, Busto Arsizio, Italy
Mecchaniche Moderne, Corso Sempione 51, Busto Arsizio, Italy
Franklin P. Miller & Son, 36 Meadow St., East Orange, N. J.
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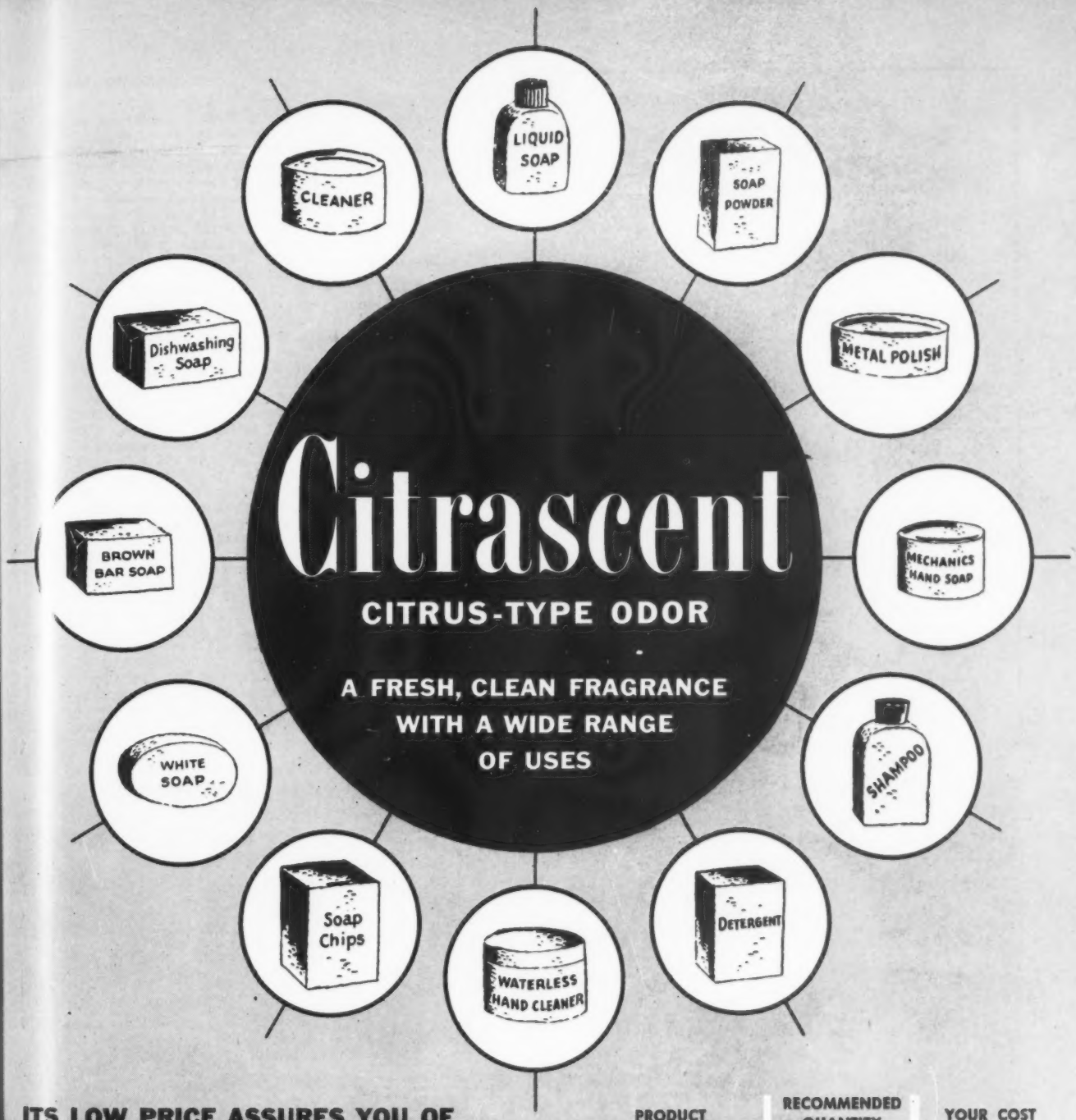

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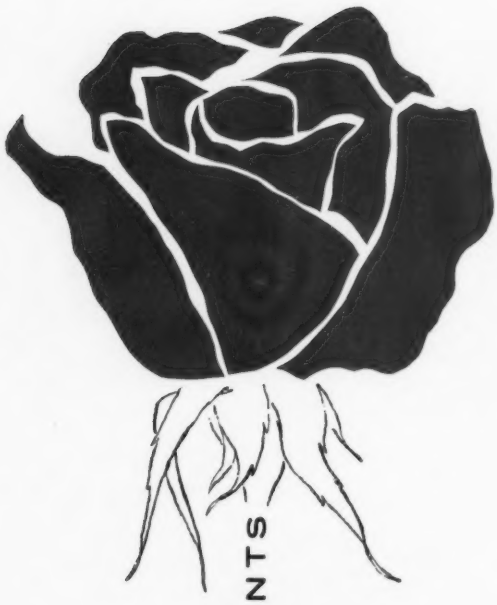

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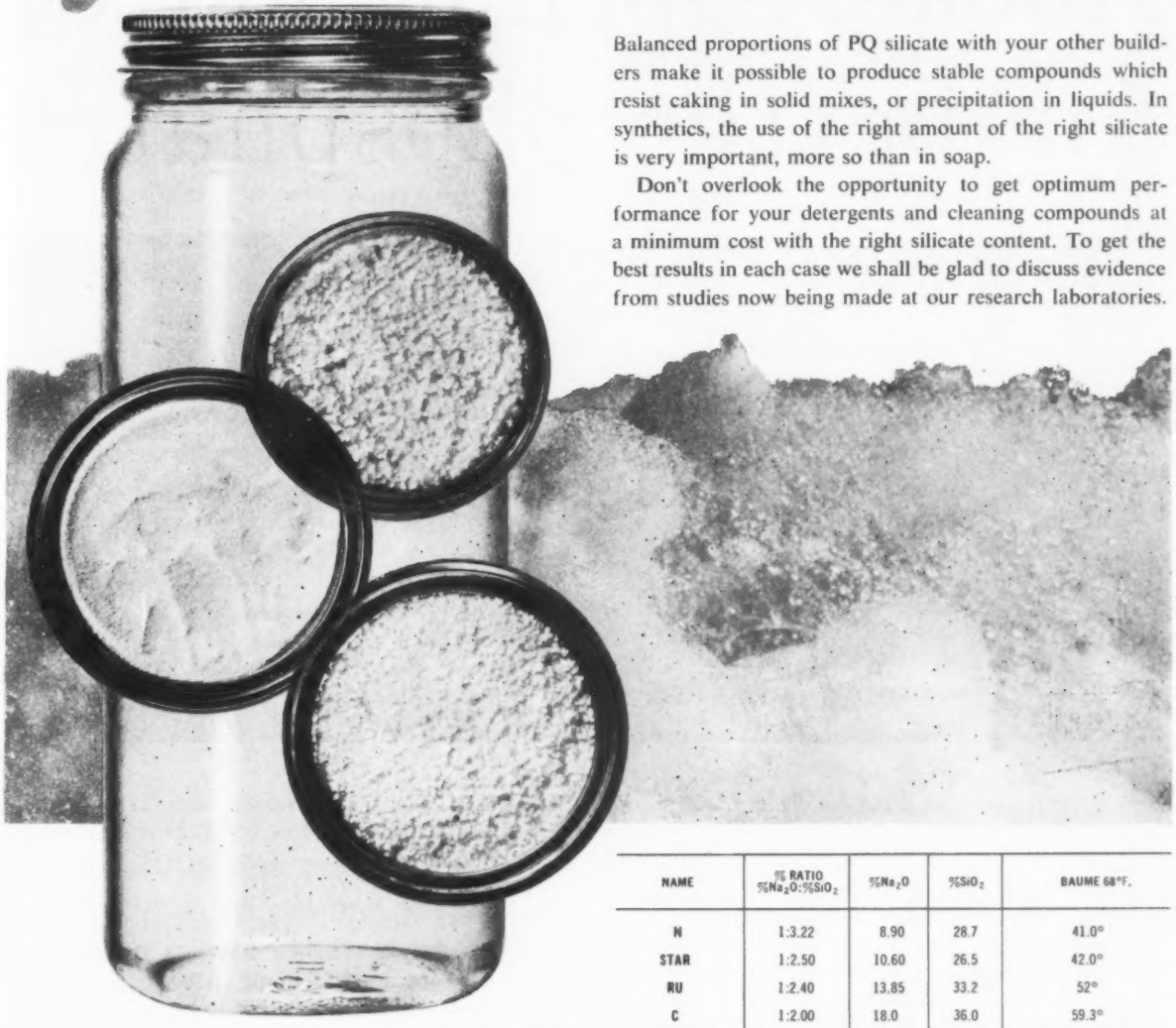

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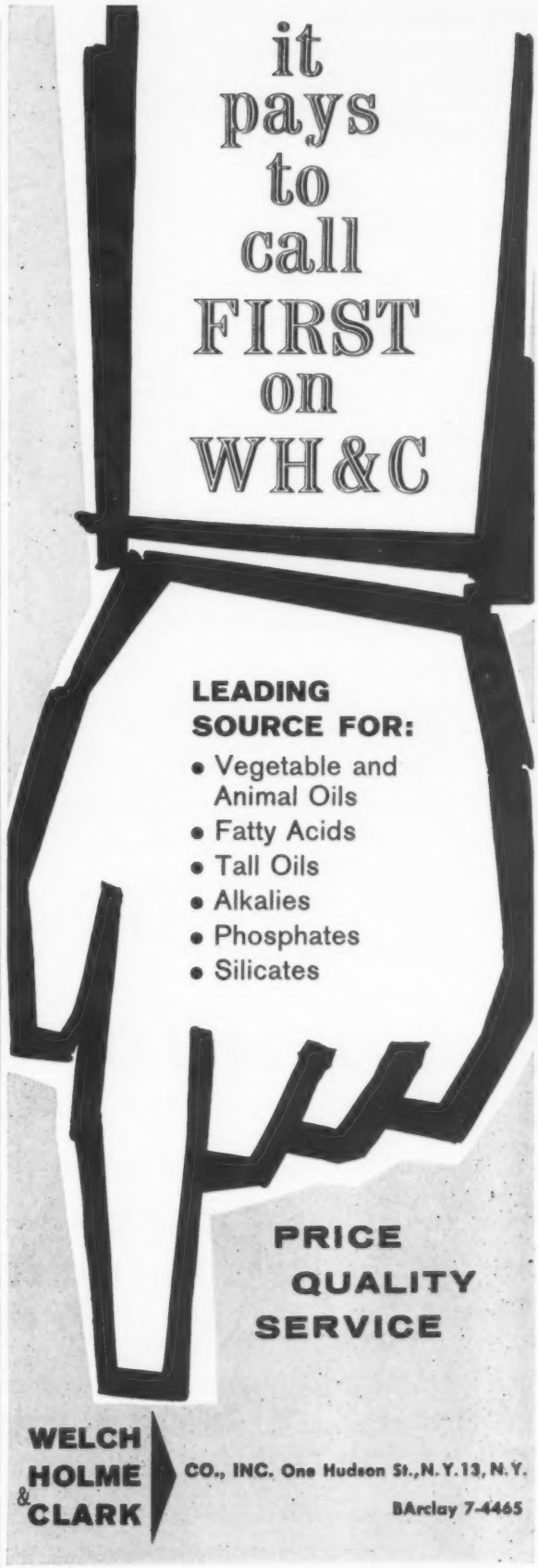

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Diamond Alkali Co., Union Commerce Bldg., Cleveland
Philadelphia Quartz Co., 1056 Public Ledger Bldg., Phila. 6
Robeco Chemicals, Inc., 23 E. 26th St., N. Y. 10
Jos. Turner & Co., Ridgefield, N. J.
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13

SODIUM SILICATE

Allied Chemical Corp., General Chem. Div., 40 Rector St., N. Y.
Diamond Alkali Co., Union Commerce Bldg., Cleveland
E. I. du Pont de Nemours & Co., Wilmington, Del.
Philadelphia Quartz Co., 1056 Public Ledger Bldg., Phila. 6
Robeco Chemicals, Inc., 23 E. 26th St., N. Y. 10
Joseph Turner & Co., Ridgefield, N. J.
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13

SODIUM SILICOFLUORIDE

Allied Chemical Corp., General Chem. Div., 40 Rector St., N. Y.
Amer. Agricultural Chem. Co., 100 Church St., N. Y.
American-British Chem. Supplies, 180 Madison Ave., N. Y. 16
American Fluoride Corp., 151 W. 19th St., N. Y.
Blockson Chemicals, Joliet, Ill.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Merck & Co., Rahway, N. J.
Robeco Chemicals, Inc., 23 E. 26th St., N. Y. 10
Henry Sundheimer, Inc., 103 Park Ave., N. Y.
Tennessee Corp., Atlanta, Ga.
Joseph Turner & Co., Ridgefield, N. J.
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13

SODIUM STEARATE

E. F. Drew & Co., 10 E. 26 St., N. Y.
Mallinckrodt Chem. Wks., St. Louis, Mo.
Nopco Chem. Co., 60 Park Pl., Newark, N. J.
Witco Chem. Co., 122 E. 42 St., N. Y.

SODIUM SULFATE (Glauber's Salt)

Allied Chemical Corp., General Chem. Div., 40 Rector St., N. Y.
American Cyanamid Co., 30 Rockefeller Center, N. Y.
American Potash & Chem. Corp., 3030 W. 6th St., Los Angeles 54
J. T. Baker Chem. Co., Phillipsburg, N. J.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Harshaw Chem. Co., 1945 E. 97th St., Cleveland
Koppers Co., Chamber of Commerce Bldg., Pittsburgh
Morton Chem. Co., 110 N. Wacker Dr., Chicago 6
Prior Chem. Corp., 420 Lexington Ave., N. Y. 17
Jos. Turner & Co., Ridgefield, N. J.
U. S. Borax & Chemical Corp., 50 Rockefeller Plaza, N. Y. 20

HIGH QUALITY

SODIUM SULPHATE

PRIOR CHEMICAL CORPORATION
420 LEXINGTON AVENUE
NEW YORK

CABLE: PRIORCHEM NEW YORK
PHONE: LExington 2-9811

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Imparts beneficial qualities to hand cleansers. Special grades available for commercial and industrial detergents and cleansers. Sodium Tetraborate, technical 99.5% $Na_2B_4O_7 \cdot 10H_2O$. Grades: fine and coarse granular, powdered.

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Low cost, versatile builder for detergents, cleansers and chemical specialties. Sodium Sulphate anhydrous, 99% Na_2SO_4 minimum. Grades: Papermakers', industrial and Syndet.

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A dependable source of alkali for industrial detergents and cleaning compounds. Sodium carbonate, technical 58% Na_2O. Grades: granular and fine granular.

TRONA® offers the advantages of a single source of these basic chemicals for premium grade soaps and cleaning compounds!

quality... uniformity and the lowest possible cost!

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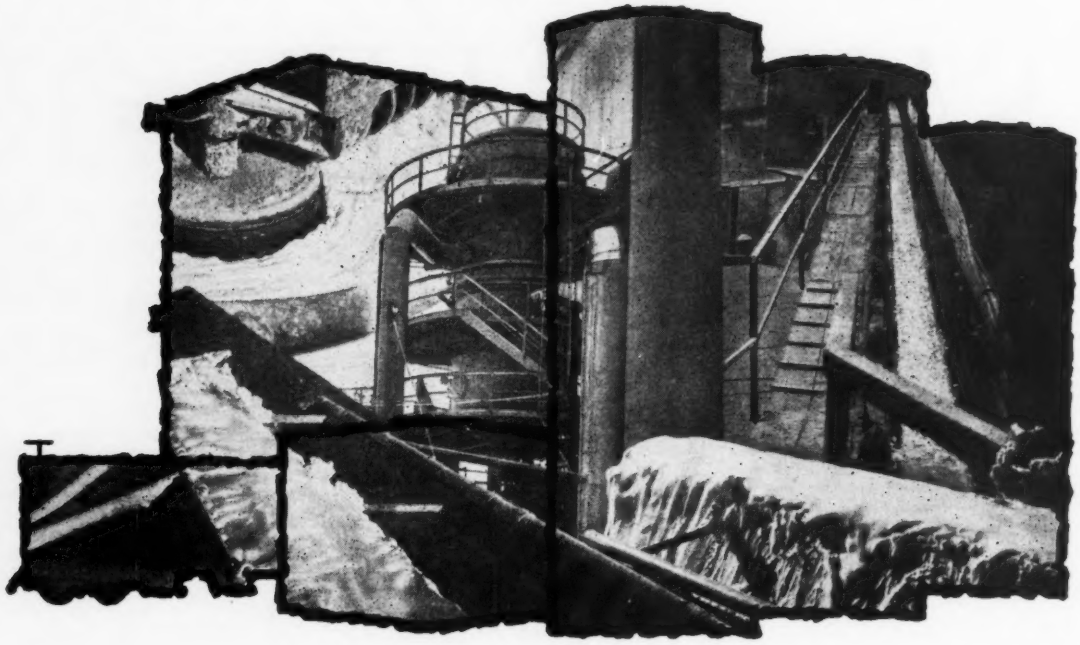
Executive Offices: 3000 WEST SIXTH STREET, LOS ANGELES 54, CALIFORNIA

Sales Offices: 3000 W. 6TH ST., **LOS ANGELES 54, CALIF.**, DU 2-8231 • 99 PARK AVE., N. Y. 16, N. Y., OX 7-0544 • 235 MONTGOMERY ST., **SAN FRANCISCO 4, CALIF.**, DO 2-1300 • 1320 S.W. BROADWAY, **PORTLAND 1, ORE.**, CA 6-2463 • 3330 PEACHTREE RD., N.E. **ATLANTA 5, GA.**, 231-3330 • 3557 W. PETERSON AVE., **CHICAGO 45, ILL.**, CO 7-0817 • 1600 FAIRFIELD AVE., **SHREVEPORT, LA.**, 425-4488 • 2025 RIVERSIDE DRIVE, **COLUMBUS 21, OHIO**, HU 6-9465

WEST END

advance planning

OF EXPANDED SODA ASH AND SODIUM SULFATE PRODUCTION ANTICIPATES INDUSTRY'S GROWING NEEDS



WEST END demonstrates its complete reliability as a major source by the continuing enlargement of its production facilities devoted to the manufacture of highest quality soda ash and anhydrous sodium sulfate as prime products. Independent of other product production and located at the sites of vast natural raw material supply, West End is solidly qualified to handle the complete requirements of customers dependably, economically and efficiently.

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WEST END CHEMICAL COMPANY • DIVISION OF STAUFFER CHEMICAL COMPANY

636 CALIFORNIA STREET, SAN FRANCISCO, CALIFORNIA • PLANT: WESTEND, CALIFORNIA

SODIUM SULFATE (Cont'd.)

U. S. Industrial Chems. Co., 99 Park Ave., N. Y. 16
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13
West End Chemical Co., 636 California St., San Francisco, Calif.

SODIUM SULFITE

Allied Chemical Corp., General Chem. Div., 40 Rector St., N. Y.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Mallinckrodt Chemical Wks., St. Louis, Mo.
Koppers Co., Chamber of Commerce Bldg., Pittsburgh
Prior Chemical Corp., 420 Lexington Ave., N. Y.
A. R. Maas Chem. Co., 4570 Ardine St., South Gate, Calif.
Reichhold Chemicals, Inc., White Plains, N. Y.
Robeco Chems., Inc., 25 E. 26 St., N. Y.
Victor Chemical Works, 155 N. Wacker Dr., Chicago
U. S. Industrial Chems. Co., 99 Park Ave., N. Y. 16

SODIUM TETRABORATE

American Potash & Chem. Corp., 3030 W. 6th St., Los Angeles 54
E. I. du Pont de Nemours & Co., Wilmington, Del.
Robeco Chems., Inc., 25 E. 26 St., N. Y.
Stauffer Chem. Co., 380 Madison Ave., N. Y. 17
U. S. Borax & Chem. Corp., 50 Rockefeller Plaza, N. Y.
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13

SODIUM TOLUENE SULFONATE

Continental Chem. Co., 195 21 Ave., Paterson, N. J.
Continental Oil Co., 1270 Ave. of Americas, N. Y. 20
M. Michel & Co., 90 Broad St., N. Y. 4
Nease Chem. Co., P. O. Box 221, State College, Pa.
Pilot Chemical Co., 11756 Burke St., Santa Fe Springs, Calif.
Tennessee Corp., 619 Grant Bldg., Atlanta, Ga.
Treplow Chem. Co., 100 New St., Paterson, N. J.
Ultra Chem. Wks., 2 Wood St., Paterson, N. J.
Witco Chem. Co., 122 E. 42 St., N. Y. 17

SODIUM TRIPOLYPHOSPHATE

Am. Agricultural Chem. Co., 100 Church St., N. Y. C.
Blockson Chemicals, Joliet, Ill.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Food Machy. & Chem. Corp., 161 E. 42 St., N. Y.
Phosphorous Div., Hooker Chem. Corp., 666 5 Ave., N. Y.
Monsanto Chemical So., St. Louis, Mo.
Rumford Chem. Wks., Rumford, R. I.
Victor Chemical Wks., 155 N. Wacker Dr., Chicago 6
Virginia-Carolina Chem. Corp., Richmond 8, Va.
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13

SODIUM XYLENE SULFONATE

American Alcolac Corp., 3440 Fairfiield Rd., Baltimore
Continental Chem. Co., 195 21 Ave., Paterson, N. J.
Continental Oil Co., 1270 Ave. of Americas, N. Y. 20
Intex Chem. Corp., 167 Main St., Lodi, N. J.
M. Michel & Co., 90 Broad St., N. Y. 4
Nease Chem. Co., P. O. Box 221, State College, Pa.
Pilot Chemical Co., 11756 Burke St., Santa Fe Springs, Calif.
Tennessee Corp., 619 Grant Bldg., Atlanta, Ga.
Treplow Chem. C.o, 100 New St., Paterson, N. J.
Ultra Chem. Wks., 2 Wood St., Paterson, N. J.
Witco Chem. Co., 122 E. 42nd St., N. Y. 4

SOFT SOAPS (see Soap, Potash)

SOFTENERS (Textile)

Antara Chemicals, 435 Hudson St., N. Y.
Archer-Daniels-Midland Co., Minneapolis 2, Minn.
Armour Industrial Chemical Co., 110 N. Wacker Dr., N. Y. C.
American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
Atlas Powder Co., Wilmington, Dela.
Burkart-Schier Chem. Co., Chattanooga, Tenn.
Colgate-Palmolive Co., 300 Park Ave., N. Y.
Concord Chem. Co., 205 E. 2nd St., Camden, N. J.
Continental Chem. Co., 195 21 Ave., Paterson, N. J.
Continental Oil Co., 1270 Av. of Americas, N. Y. 20
E. F. Drew & Co., 10 E. 26 St., N. Y. 11
E. I. du Pont de Nemours & Co., Wilmington, Del.
Eastern Color & Chem. Co., 35 Livingston St., Providence, R. I.
Emery Industries, Carew Tower, Cincinnati
Enjay Chem. Co., 15 W. 51 St., N. Y. 19
Finetex, Inc., 418 Falmouth Ave., East Paterson, N. J.
Geigy Industrial Chemicals, Ardsley, N. Y.
General Mills, Chem. Div., Kankakee, Ill.
Glidden Co., Jacksonville 1, Fla.
Intex Chem. Corp., 167 Main St., Lodi, N. J.
Kessler Chem. Co., State Rd., Phila. 35
Klix Chem. Co., 551 Railroad Ave., S. San Francisco
M. Michel & Co., 90 Broad St., N. Y.
Nopco Chem. Co., 60 Park Pl., Newark 1, N. J.
Onyx Chemical Corp., Warren & Morris Sts., Jersey City 2, N. J.
Process Chem. Co., 8733 S. Dice Rd., Santa Fe Springs, Calif.
Quaker Chem. Prods. Corp., Conshohocken, Pa.
Rohm & Haas Co., 222 W. Washington Sq., Phila.
Rozilda Laboratories, 44-18 Purvis St., L. I. C., N. Y.
Rumford Chem. Wks., Rumford, R. I.
Sandoz, Inc., 61 Van Dam St., N. Y. 13
Silicones Division, Union Carbide Corp., 270 Park Ave., N. Y.
Sole Chem. Corp., 7740 S. Chicago Ave., Chicago
Sonneborn Chem. & Refin'g Corp., 300 4th Ave., N. Y.
Stecker Chems., Inc., 45 N. Broad St., Ridgewood, N. J.
Stepan Chem. Co., 427 W. Randolph St., Chicago 6
Treplow Chemical Co., 59 Camden St., Paterson, N. J.
Tanatex Chem. Corp., Belleville Turnpike, Kearny, N. J.
Ultra Chem. Wks., 2 Wood St., Paterson, N. J.
Witco Chem. Co., 122 E. 42nd St., N. Y. 17

SOIL FUMIGANTS

American-British Chem. Supplies, 180 Madison Ave., N. Y.
American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
Amer. Potash & Chem. Corp., 3030 W. 6th St., Los Angeles, Calif.
Calif. Spray-Chemical Corp., Richmond, Calif.
Commercial Solvents Corp., 260 Madison Ave., N. Y.
Diamond Alkali Co., Union Commerce Bldg., Cleveland
Dow Chemical Co., Midland, Mich.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Food Machy. & Chem. Corp., 161 E. 42 St., N. Y.
Frontier Chem. Co., Wichita, Kan.
Geigy Agricultural Chemicals, Ardsley, N. Y.
Jefferson Chem. Co., 1121 Walker Ave., Houston
Kolker Chem. Corp., 600 Doremus Ave., Newark 5
Monsanto Chemical Co., St. Louis, Mo.
Morton Chem. Co., 110 N. Wacker Dr., Chicago 6
Rohm & Haas Co., Inc., 222 W. Washington Sq., Philadelphia
Shell Chem. Corp., 50 W. 50th St., N. Y.
Stauffer Chem. Co., 380 Madison Ave., N. Y.
Union Carbide Chems. Co., 270 Park Ave., N. Y.

SOLUBLE OILS (see Sulfonated Oils)

SOLUTIONIZING DEVICES (see Soap Solutionizing Devices)

SOLVENTS, ETHER (see Ethers)

SOLVENTS, CHLORINATED (see also alcohols, coal tar derivatives, etc.)

Allied Chem. Corp., Solvay Process Div., 61 Rector St., N. Y.
Amsco Solvents & Chemical Co., 4619 Reading Road, Cincinnati 29
Buffalo Solvents & Chemicals Corp., Box 73, Station B, Buffalo 7, N. Y.
Central Solvents & Chemicals Co., 2540 W. Flournoy St., Chicago 12
Commercial Solvents Corp., 260 Madison Ave., N. Y. 17
Diamond Alkali Co., Union Commerce Bldg., Cleveland
Dixie Solvents & Chems. Co., Dixie Highway, Louisville
Dow Chemical Co., Midland, Mich.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Eastman Chemical Prods. Co., Kingsport, Tenn.
Fine Organics, Inc., 205 Main St., Lodi, N. J.
Food Machy. & Chem. Corp., 161 E. 42 St., N. Y.
Frontier Chem. Co., Wichita, Kan.
Hercules Powder Co., 961 Market, St., Wilmington (Terpene)
Heyden Chem. Div., Heyden Newport Chem. Corp., 342 Madison Av., N.Y.
Hooker Chem. Corp., Niagara Falls, N. Y.
Hoosier Solvents & Chemicals Corp., 1650 Luett Ave., Indianapolis
Jefferson Chemical Co., 1121 Walker Ave., Houston, Tex.
Koppers Co., Chamber of Commerce Bldg., Pittsburgh
Missouri Solvents & Chemicals Co., 419 De Soto Ave., St. Louis 7, Mo.
Monsanto Chemical Co., St. Louis, Mo.
Ohio Solvents & Chemicals Co., 3470 W. 140th St., Cleveland 11, Ohio
Olin Mathieson Chem. Corp., Org. Chems., 745 5th Ave., N. Y.
Pennsalt Chems. Corp., 3 Penn Center Plaza, Phila.
Robeco Chemicals, Inc., 25 E. 26th St., N. Y. 10

SOLVENTS, CHLORINATED (Cont'd.)

Skelly Oil Co., Kansas City, Mo.
Southern Solv. & Chem. Corp., 1352 Jefferson Highway, New Orleans
Stauffer Chem. Co., 380 Madison Ave., N. Y. 17
Texas Solvents & Chemicals Co., 8501 Market St., Houston 15, Texas
Toledo Sols. & Chem. Co., 4051 South Ave., Toledo, O.
Union Carbide Chems. Co., 270 Park Ave., N. Y.
U. S. Industrial Chemicals, Inc., 99 Park Ave., N. Y. 16
Velsicol Chem. Corp., 330 E. Grand Ave., Chicago
Western Solvents & Chemicals Co., 6472 Selkirk Ave., Detroit 11
Wisconsin Solvents & Chemicals Corp., 1719 S. 83rd St., Milwaukee
Wolverine Sols. & Chems. Co., 2940 Stafford Ave., SW, Grand Rapids
Wyandotte Chemicals Corp., Mich. Alkali Div., Wyandotte, Mich.

SOLVENTS, GLYCOL ETHER

Dow Chem. Co., Midland, Mich.
Union Carbide Chems. Co., 270 Park Ave., N. Y.

SOLVENTS, NAPHTHA

Amoco Chems. Corp., 130 E. Randolph Dr., Chicago 1
Amsco Solvents & Chemicals Co., 4619 Reading Road, Cincinnati 29
Atlantic Refining Co., 260 S. Broad St., Phila.
Buffalo Solvents & Chemicals Corp., Box 73, Station B, Buffalo 7, N. Y.
Central Solvents & Chemicals Co., 2540 W. Flournoy St., Chicago 12
Dixie Solvents & Chems. Co., Dixie Highway, Louisville
Esso Standard Oil Co., 15 W. 51st St., N. Y. 19
Gulf Oil Corp., 360 Lexington Ave., N. Y. 17
Hoosier Solvents & Chemicals Corp., 1650 Luett Ave., Indianapolis
Koppers Co., Chamber of Commerce Bldg., Pittsburgh
Missouri Solvents & Chemicals Co., 419 De Soto Ave., St. Louis 7, Mo.
Ohio Solvents & Chems. Co., 3470 W. 140th St., Cleveland
Pennsylvania Industrial Chem. Corp., Clairton, Pa.
Pennsylvania Refining Co., Butler, Pa.
Reilly Tar & Chemical Corp., Indianapolis
Signal Oil & Gas Co., Houston 12, Tex.
Sinclair Petrochem., Inc., 600 5th Ave., N. Y. 20
Skelly Oil Co., 605 W. 47th St., Kansas City, Mo.
Socony Mobil Oil Co., 150 E. 42nd St., N. Y. 17
Sonneborn Chem. & Refin'g Corp., 300 4th Ave., N. Y.
Southern Solv. & Chem. Corp., 917 Jefferson Highway, New Orleans
Standard Oil Co. (Calif.), 225 Bush St., San Francisco
Texas Solvents & Chemicals Co., 8501 Market St., Houston 15, Texas
Toledo Sols. & Chems. Co., 4051 South Ave., Toledo, O.
Velsicol Corp., 330 E. Grand Ave., Chicago
Western Solvents & Chemicals Co., 6472 Selkirk Ave., Detroit 11
Wisconsin Solvents & Chemicals Corp., 1719 S. 83rd St., Milwaukee
Wolverine Solv. & Chem. Co., 2940 Stafford Ave., SW, Grand Rapids

SOLVENTS, OXYGENATED

Allied Chem. Corp., National Aniline Div., 40 Rector St., N. Y.
Amsco Sols. & Chems. Co., 3470 W. 140th St., Cincinnati
Buffalo Solvents & Chems. Corp., P. O. Box #73, Sta. B, Buffalo
Central Solvents & Chems. Co., 2540 W. Flournoy St., Chicago
Dixie Sols. & Chems. Co., Dixie Highway, Louisville
Eastman Chem. Prods., Inc., Kingsport, Tenn.
Enjay Chem. Co., 15 W. 51st St., N. Y. 19.
Hoosier Solvents & Chem. Corp., 1650 Luett St., Indianapolis
Jefferson Chemical Co., 1121 Walker Ave., Houston, Texas
Missouri Sols. & Chems. Co., 419 De Soto Ave., St. Louis
Ohio Sols. & Chems. Co., 3470 W. 140th St., Cleveland
Olin Mathieson Chem. Corp., Org. Chems., 745 5th Ave., N. Y.
Shell Chem Co., 50 W. 50 St., N. Y.
Southern Sols. & Chems. Corp., 917 Jefferson Highway, New Orleans
Texas Solvents & Chems. Co., 8501 Market St., Houston.
Toledo Sols. & Chems. Co., 4051 South Ave., Toledo, O.
Union Carbide Chems. Co., 270 Park Ave., N. Y.
U. S. Industrial Chems. Co., 99 Park Ave., N. Y.
Western Sols. & Chems. Co., 6472 Selkirk Ave., Detroit
Wisconsin Sols. & Chems. Co., 1719 S. 83rd St., Milwaukee
Wolverine Sols. & Chems. Co., 2940 Stafford Ave., SW, Grand Rapids

SOLVENTS, PETROLEUM

Amoco Chems. Corp., 130 E. Randolph Dr., Chicago 1
Amsco Solvents & Chemicals Co., 4619 Reading Road, Cincinnati 29
Atlantic Refining Co., 260 S. Broad St., Philadelphia
Buffalo Solvents & Chemicals Corp., Box 73, Station B, Buffalo 7, N. Y.
Commercial Solvents Corp., 260 Madison Ave., N. Y. 17
Dixie Solvents & Chems. Co., Dixie Highway, Louisville
Esso Standard Oil Co., 15 W. 51st St., N. Y.
Hoosier Solvents & Chemicals Corp., 1650 Luett Ave., Indianapolis 22
Missouri Solvents & Chemicals Co., 419 De Soto Ave., St. Louis 7, Mo.
Ohio Solvents & Chemicals Co., 3470 W. 140th St., Cleveland 11, Ohio
Penna. Industrial Chem. Corp., Clairton, Pa.
Pennsylvania Refining Co., Butler, Pa.
Phillips Petroleum Co., Bartlesville, Okla.
Robeco Chemicals, Inc., 25 E. 26th St., N. Y. 10
Shell Oil Co., 50 W. 50th St., N. Y.
Signal Oil & Gas Co., Houston 12, Tex.
Sinclair Petrochems., Inc., 600 5th Ave., N. Y. 20
Skelly Oil Corp., 605 W. 47th St., Kansas City, Mo.
Socony Mobil Oil Co., 150 E. 42nd St., N. Y. 10
Sonneborn Chem. & Refin'g Corp., 300 4th Ave., N. Y. 10
Southern Solv. & Chems. Corp., 917 Jefferson Highway, New Orleans
Standard Oil Co. (Calif.), 225 Bush St., San Francisco
Standard Oil Co. (Ohio), Midland Bldg., Cleveland
Sun Oil Co., 1608 Walnut St., Phila. 3
Texaco, Inc., 135 E. 42nd St., N. Y. 17
Texas Solvents & Chemicals Co., 8501 Market St., Houston 15, Texas
Toledo Sols. & Chems. Co., 4051 South Ave., Toledo
Velsicol Chem. Corp., 330 Grand Ave., Chicago
Western Solvents & Chemicals Co., 6472 Selkirk Ave., Detroit 11
Wisconsin Solvents & Chemicals Corp., 1719 S. 83rd St., Milwaukee
Wolverine Solv. & Chems. Co., 2940 Stafford Ave., SW, Grand Rapids

SOYA BEAN OIL

Archer-Daniels-Midland Co., Minneapolis, Minn.
Balfour, Guthrie Co., 67 Wall St., N. Y.
E. F. Drew & Co., 15 E. 26 St., N. Y. 10
Eastern Industries, Inc., Ridgefield, N. J.
Pacific Vegetable Oil Co., 1145 S. 10th St., Richmond, Calif.
Purina Mills, St. Louis
A. E. Staley Mfg. Co., Decatur, Ill.
Swift & Co., Hammond, Ind.
Vegetable Oil Prods., 5568 E. 61 St., Los Angeles
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13
G. S. Ziegler & Co., Great Neck, N. Y.

SOYA BEAN FATTY ACIDS

Archer-Daniels-Midland Co., Minneapolis, Minn.
Armour Industrial Chemical Co., 110 N. Wacker Dr., Chicago
Capital City Prods. Co., 525 W. 1st St., Columbus, O.
E. F. Drew & Co., 15 E. 26 St., N. Y. 10
Emery Industries, Carew Tower, Cincinnati 2
A. Gross & Co., 295 Madison Ave., N. Y. 17
Harchem Div., 25 Main St., Belleville, N. J.
Kamen Soap Prods. Co., 5-22 50 Ave., L. I. C. 1, N. Y.
Procter & Gamble Dist. Co., Cincinnati 1
Robeco Chemicals, Inc., 23 E. 26th St., N. Y. 10
Swift & Co., Hammond, Ind.
Vegetable Oil Prods., 5568 E. 61 St., Los Angeles
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13
Wilson-Martin Div., Snyder Ave. & Swanson St., Phila.
Woburn Chem. Corp., 1200 Harrison Ave., Kearny, N. J.
G. S. Ziegler & Co., Box 348, Great Neck, N. Y.

SPERMACETI

Archer-Daniels-Midland Co., Minneapolis, Minn.
F. A. Marsilly & Co., 15 Whitehall St., N. Y.
Murray Oil Prods. Co., 21 West St., N. Y.
J. H. Redding Co., 17 Battery Pl., N. Y.
Werner G. Smith, Inc., 1730 Train Ave., Cleveland
Swift & Co., Hammond, Ind.
Wilbur-Ellis Co., 17 Battery Pl., N. Y.

SPOT REMOVERS (see Stain Removers)

SPOTTING FLUIDS (see Cleaning Fluids)

SPOUTS (see Can Spouts)

SPRAY DRYERS (engineering and installation)

Bowen Engineering, Inc., North Branch, N. J.
G. Mazzoni, Busto Arsizio, Italy
Mecchaniche Moderne, Corso Sempione 51, Busto Arsizio, Italy
Procter & Schwartz, Inc., 7th St. & Tabor Rd., Phila.
Foster D. Snell, 29 W. 15th St., N. Y. 11
Swenson Evaporator Div., Whiting Corp., Whiting, Ill.
Wurster & Sanger, 5201 S. Kenwood Ave., Chicago

SPRAY SYSTEMS, PERMANENT INSTALLATIONS

Mecchaniche Moderne, Corso Sempione 51, Busto Arsizio, Italy
Spraying Systems, Inc., 3266 Randolph St., Bellwood, Ill.
Virginia Smelting Co., West Norfolk, Va.
Z & W Mfg. Corp., 30240 Lakeland Blvd., Wickliffe, O.

SPRAYER NOZZLES (see Nozzles)

SPRAYERS, ATOMIZING (hand)

Arnold-Copeland Corp., 22 Elkins St., Norton, Mass.
Calmar Distributors, Inc., 5020 Spring Grove, Cincinnati, O.
R. E. Chapin Mfg. Wks., Batavia, N. Y.
Dobbins Div., Chamberlain Corp., Waterloo, Iowa
Evans-Crowder Co., South Lyon, Mich.
Federal Tool Corp., 3600 S. Pratt Blvd., Chicago 45
Gallo Co., 1312 Forest St., Racine, Wisc.
Hub States Chems. & Equipment, 1255 N. Windsor St., Indianapolis
H. D. Hudson Mfg. Co., 589 E. Illinois St., Chicago
MacCarl Co., 4342 Pearl Rd., Cleveland, O.
D. B. Smith & Co., 414 Main St., Utica, N. Y.
Spraying Systems, Inc., 3266 Randolph St., Bellwood, Ill.
Z & W Mfg. Corp., 30240 Lakeland Blvd., Wickliffe, O.

SPRAYERS, COMPRESSED AIR (pressurized tank)

Acmeline Mfg. Co., Traverse City, Mich.
Aireactor Corp., 271 Madison Ave., N. Y. 16
Champion Sprayer Co., 6523 Heintz Ave., Detroit 11
R. E. Chapin Mfg. Co., Batavia, N. Y.
Dema Engineering Co., 10020 Big Bend, St. Louis 22
DeVilbiss Co., Toledo, O.
Dobbins Div.—Chamberlain Corp., Waterloo, Iowa
Gallo Co., 1312 Forest St., Racine, Wis. (built in systems)
Gray Co., 60 11 Ave., Minneapolis
Hub States Chems. & Equipment, 1255 N. Windsor St., Indianapolis
H. D. Hudson Mfg. Co., 589 E. Illinois St., Chicago
Root-Lowell Corp., 445 N. Lake Shore Dr., Chicago
D. B. Smith & Co., 414 Main St., Utica, N. Y.
Spraying Systems Co., 3266 Randolph St., Bellwood, Ill.
Universal Metal Prods. Co., Lowell, Mich.

SPRAYERS, ELECTRIC

Acmeline Mfg. Co., Traverse City, Mich.
Aireactor Corp., 271 Madison Ave., N. Y. 16
Binks Mfg. Co., 3114 Carroll Ave., Chicago
Breuer Elect. Mfg. Co., 5100 N. Ravenswood Ave., Chicago 40
DuLa Mfg. Co., 351 Atlantic Ave., Brooklyn, N. Y.
Hub States Chems. & Equipment, 1255 N. Windsor St., Indianapolis
H. D. Hudson Mfg. Co., 589 E. Illinois St., Chicago
Root-Lowell Corp., 445 N. Lake Shore Dr., Chicago
Z & W Mfg. Corp., 30240 Lakeland Blvd., Wicklifle. O.

SPRAYERS, FOGGING

Buffalo Turbine Agr. Equip. Co., Gowanda, N. Y.
Curtis Automatic Devices, Medford, Ind.
Hub States Chems. & Equipment, 1255 N. Windsor St., Indianapolis
H. D. Hudson Mfg. Co., 589 E. Illinois St., Chicago
Gallo Co., 1312 Forest St., Racine, Wisc.
Todd Shipyards Corp., 81-16 45th Ave., Elmhurst, N. Y.
Z&W Mfg. Corp., 30240 Lakeland Blvd., Wickliffe, O.

SPRAYERS, HAND (spray gun type)

Acmeline Mfg. Co., Traverse Ctiy, Mich.
R. E. Chapin Mfg. Co., Batavia, N. Y.
Dobbins Div.—Chamberlain Corp., Waterloo, Iowa
Hub States Chems. & Equipment, 1255 N. Windsor St., Indianapolis
H. D. Hudson Mfg. Co., 589 E. Illinois St., Chicago
MacCarl Co., 4342 Pearl Rd., Cleveland, O.
Root-Lowell Corp., 445 N. Lake Shore Dr., Chicago
D. B. Smith & Co., 414 Main St., Utica, N. Y.
Standard Container, Inc., Rockaway, N. J.
Universal Metal Prods. Co., Lowell, Mich.
Volume Sprayer Mfg. Co., Tulsa, Okla.
Z & W Mfg. Corp., 30240 Lakeland Blvd., Wickliffe, O.

SPRAYERS, HEAVY DUTY

John Bean Mfg. Co., Div. Food Mach. Co., Lansing, Mich.
Buffalo Turbine Agr. Equip. Co., Gowanda, N. Y.
Dobbins Div.—Chamberlain Corp., Waterloo, Iowa
A. B. Farquhar Co., 142 N. Duke St., York, Pa.
Gallo Co., 1312 Forest St., Racine, Wisc.
Gray Co., 60—11 Ave., Minneapolis
H. D. Hudson Mfg. Co., 589 E. Illinois St., Chicago
Hardie Mfg. Co., Hudson, Mich.
F. E. Myers & Brothers Co., Ashland, O.
Victor Products Corp., Ranson, W. Va.

SPRAYERS, STEAM

Arnold Laboratories, 7103 Laurel Canyon Blvd., N. Hollywood, Calif.
DuLa Mfg. Co., 351 Atlantic Ave., Brooklyn
Madewell Products, Inc., 3125 E. 7th St., Oakland, Calif.
Root-Lowell Corp., 445 N. Lake Shore Dr., Chicago

SQUEEZE BOTTLES (see Bottles, Plastic)

SQUILLS (Rodent Poison)

A-M-R Chemical Co., 985 E. 35th St., Bklyn. 10
Chem. Insecticide Corp., 30 Whitman Ave., Metuchen, N. J.
S. B. Penick & Co., 100 Church St., N. Y.
Prentiss Drug & Chem. Co., 101 W. 31st St., N. Y. 1
Uncle Sam Chem. Co., 575 W. 131st St., N. Y. 27
York Chem. Co., 23 Dean St., Bklyn.

STABILIZERS (see Emulsion Stabilizers; Foam Stabilizers)

STAIN REMOVERS

ABC Compounding Co., Oakcliff & Harwell Rds., Atlanta, Ga.
B & W Chem. Co., 25920 Belle Porte, Harbor City, Calif.
R. S. Cowan Co., 9 E. 38th St., N. Y. C.
Davies-Young Soap Co., Dayton, O.
Dettelbach Chem. Corp., 4111 Peachtree Rd., Atlanta 19
Fuld Bros., 702 S. Wolfe St., Baltimore
Golden Star Polish Mfg. Co., 400 E. 10th St., N. Kansas City, Mo.
R. M. Hollingshead Corp., Camden, N. J.
Hysan Prods. Co., 930 W. 38th Place, Chicago 9
Klix Chem. Co., 551 Railroad Ave., S. San Francisco
Pace, Inc., Box 206, Wilmington, Dela.
Peterson Filling & Packaging Co., Hegeler Lane, Danville, Ill.
Regal Chem. Corp., 115 Dobbin St., Brooklyn 22
Tex-ite Prods. Corp., 859 E. 43 St., Brooklyn 10
Trio Chem. Wks., 341 Scholes St., Brooklyn
Wilco Co., 4425 Bandini Blvd., Los Angeles 23

STANNOUS CHLORIDE (see Tin Crystals)

STARCH

American Maize Products Co., 250 Park Ave., N. Y.
Archer-Daniels-Midland Co., Minneapolis 2
Corn Products Sales Co., 17 Battery Pl., N. Y.
Hercules Powder Co., Wilmington, Dela.
National Starch & Chem. Corp., 750 Third Ave., N. Y. 17
Pennsalt Chems. Corp., 3 Penn Center, Phila.
A. E. Staley Mfg. Co., Decatur, Ill.

STARCH, LIQUID

Barton Chem. Co., 1230 W. 46 St., Chicago
Hercules Powder Co., Wilmington, Del.
Morningstar-Paisley, Inc., 630 W. 51 St., N. Y.
Penick & Ford, 420 Lexington Ave., N. Y. 17
A. E. Staley Mfg. Co., Decator 60, Ill.

STEAM CLEANING EQUIPMENT

John Bean Division, S. Cedar St., Lansing, Mich.
Clayton Mfg. Co., Mentor Ave., Cincinnati
Sellers Injector Corp., 1600 Hamilton St., Phila. 30

STEARATES (Zinc, Calcium, Magnesium, etc.)

Air Reduction Chem. Co., 150 E. 42 St., N. Y. 17
American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
Antara Chemicals Div., 435 Hudson St., N. Y.
Capital City Prods. Co., 525 W. 1st St., Columbus, O.
Commercial Solvents Corp., 260 Madison Ave., N. Y. 17
E. I. du Pont de Nemours & Co., Wilmington, Del.
R. W. Greeff & Co., 10 Rockefeller Plaza, N. Y. 10
Harshaw Chemical Co., 1945 E. 97th St., Cleveland

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EMCOL MAS—opacifiers
EMCOL 61—hair conditioners

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EMCOL RDC-D—diethylene glycol laurate
EMCOL CAD—diethylene glycol stearate
EMCOL DOS—diethylene glycol oleate
EMCOL H-38A, EMCOL H-31A, EMCOL H-35A—polyethylene glycol esters—laurate, oleate, stearate

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STEARATES (Cont'd.)

Intex Chem. Corp., 167 Main St., Lodi, N.J.
Mallinckrodt Chem. Wks., St. Louis, Mo.
Merck & Co., Rahway, N. J.
Millmaster Chem. Corp., 99 Park Ave., N. Y. 16
Nopco Chem. Co., 60 Park Pl., Newark 1, N. J.
Robeco Chemicals, Inc., 25 E. 26th St., N. Y. 10
Jos. Turner & Co., Ridgefield, N. J.
Whittaker, Clark & Daniels, 100 Church St., N. Y.
Witco Chemical Co., 122 E. 42nd St., N. Y.

STEARIC ACID

Archer-Daniels-Midland Co., Minneapolis, Minn.
Capital City Prods. Co., 525 W. 1st St., Columbus, O.
Armour Industrial Chemical Co., 110 N. Wacker Dr., Chicago
Acme-Hardesty Co., 60 E. 42nd St., N. Y. C.
Concord Chem. Co., 205 S. 3nd St., Camden, N. J.
Darling & Co., 4201 S. Ashland Ave., Chicago
E. F. Drew & Co., 15 E. 26 St., N. Y. 10
Eastern Industries, Inc., Ridgefield, N. J.
Emery Industries, Inc., 4300 Carew Tower, Cincinnati
Fine Organics, Inc., 205 Main St., Lodi, N. J.
A. Gross & Co., 295 Madison Ave., N. Y.
Harchem Div., Inc., 25 Main St., Belleville 9, N. J.
Humko Chem. Dept., 501 Allwood Ave., Clifton, N. J.
Kamen Soap Prods. Co., 5-22 50 Ave., L. I. C. 1, N. Y.
Orbis Products Corp., 601 W. 26th St., N. Y.
Robeco Chemicals, Inc., 25 E. 26th St., N. Y. 10
Swift & Co., Hammond, Ind.
Joseph Turner & Co., Ridgefield, N. J.
Vegetable Oil Prods., 5568 E. 61 St., Los Angeles
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13
Will & Baumer Candle Co., Syracuse, N. Y.
Wilson-Martin Div., Snyder & Swanson, Phila.
Witco Chemical Co., 122 E. 42nd St., N. Y.
Woburn Chemical Corp., 1200 Harrison Ave., Kearny, N. J.
G. S. Ziegler & Co., Box 348, Great Neck, N. Y.

STEARINE

Acme Hardesty Co., 60 E. 42nd St., N. Y.
Allied Asphalt & Mineral Corp., 39 Water Mill Lane, Great Neck, N. Y.
Archer-Daniels-Midland Co., Minneapolis
Armour Ind. Chemical Co., 110 N. Wacker Dr., Chicago
Eastern Industries, Inc., Ridgefield, N. J.
Independent Mfg. Co., Bridgesburg, P. O., Phila.
Neatsfoot Oil Refineries Corp., E. Ontario & Bath Sts., Phila.
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13
G. S. Ziegler & Co., Box 348, Great Neck, N. Y.
Zophar Mills, Inc., 112 26th St., Brooklyn, N. Y.

STEARINE PITCH

Allied Asphalt & Mineral Corp., 39 Water Mill Lane, Great Neck, N. Y.
Archer-Daniels-Midland Co., Minneapolis
Emery Industries, Carew Tower, Cincinnati
A. Gross & Co., 295 Madison Ave., N. Y. 17
Neatsfoot Oil Refineries Corp., Ontario & Bath Sts., Phila.
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13
G. S. Ziegler Co., Box 348, Great Neck, N. Y.
Zophar Mills, 112 26th St., Bklyn.

STEEL PAILS (see Pails, Steel)

STEEL WOOL

American Steel Wool Mfg. Co., 41-24 Orchard St., L. I. City, N. Y
Brillo Co., 60 John St., Bklyn. 1
DuraWool, Inc., 96-59 222nd St., Queens Village, N. Y.
International Steel Wool Co., Springfield, Ohio
S.O.S. Co., 7123 W. 65th St., Chicago 38
Williams Co., London, Ohio

STOCK SPRAYS and DIPS (see Cattle Dips and Sprays)

SUDSING EQUIPMENT (see Soap Solutionizing Devices)

SULFAMIC ACID

Blockson Chems., Joliet, Ill.
E. I. du Pont de Nemours & Co., Wilmington, Del.

SULFATED HIGHER FATTY ALCOHOLS

American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
Archer-Daniels-Midland Co., Minneapolis, Minn.
American Alcolac Corp., 3440 Fairfield Rd., Baltimore
Armour Industrial Chemical Co., 110 N. Wacker Dr., Chicago
Antara Chem. Div., 435 Hudson St., N. Y.
Continental Chem. Co., 195 21 Ave., Paterson, N. J.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Intex Chem. Corp., 167 Main St., Lodi, N. J.
Finetex, Inc., 418 Falmouth Ave., East Paterson, N. J.
M. Michel & Co., 90 Broad St., N. Y. 4
Nopco Chemical Co., 60 Park Pl., Newark 1, N. J.
Onyx Chemical Corp., Warren & Morris Sts., Jersey City 2, N. J.
Pennsalt Chems. Corp., 3 Penn Center Plaza, Phila.
Process Chems. Co., 8733 S. Dice Rd., Santa Fe Springs, Calif.
Sole Chem. Corp., 7740 S. Chicago Ave., Chicago
Stepan Chem. Co., 427 W. Randolph St., Chicago
Surfact-Co., P. O. Box 114, Blue Island, Ill
Tanatex Chem. Corp., Belleville Turnpike, Kearny, N. J.
Textilana Corp., 12607 Cerise Ave., Hawthorne, N. J.
Treplow Chem. Co., 100 New St., Paterson, N. J.
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13

SULFONATES

Allied Chem. Corp., National Aniline Div., 40 Rector St., N. Y.
American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
Amoco Chems. Corp., 130 E. Randolph Dr., Chicago 1
Antara Chemicals, 435 Hudson St., N. Y. 14
Atlantic Refining Co., 260 S. Broad St., Phila.
Colgate-Palmolive Co., 300 Park Ave., N. Y.
Continental Chem. Co., 195 21 Ave., Paterson, N. J.
Continental Oil Co., 1270 Ave. of Americas, N. Y. 20
Eastern Industries, Inc., Ridgefield, N. J.
Emery Industries, Inc., Ridgefield, N. J.
Finetex, Inc., 418 Falmouth Ave., East Paterson, N. J.
Geigy Industrial Chemicals, Ardsley, N. Y.
Intex Chem. Corp., 167 Main St., Lodi, N. J.
M. Michel & Co., 90 Broad St., N. Y.
Nease Chem. Co., P. O. Box 221, State College, Pa.
Onyx Chemical Corp., Warren & Morris Sts., Jersey City 2, N. J.
Oronite Div., Calif. Chem. Co., 200 Bush St., San Francisco
Petrochemicals Co., 420 Lexington Ave., N. Y. 17
Pilot Chem. Co., 11756 Burke St., Santa Fe Springs, Calif.
Process Chems. Co., 8733 S. Dice Rd., Santa Fe Springs, Calif.
Shell Chemical Corp., 50 W. 50th St., N. Y. 20
Sinclair Petrochems., Inc., 600 5th Ave., N. Y.
Socony Mobil Oil Co., 150 E. 42nd St., N. Y. 10
Sole Chem. Corp., 7740 S. Chicago Ave., Chicago
Sonneborn Chem. & Refin'g Corp., 300 4th Ave., N. Y. 10
Stepan Chem. Co., 427 W. Randolph St., Chicago
Sun Oil Co., 1608 Walnut St., Phila.
Surfact-Co., Inc., P. O. Box 114, Blue Island, Ill.
Swift & Co., Hammond, Ind.
Tennessee Corp., 617 Grant Bldg., Atlanta, Ga.
Textilana Corp., 12607 Cerise Ave., Hawthorne, N. J.
Treplow Chem. Co., 100 New St., Paterson, N. J.
Ultra Chem. Wks., 2 Wood St., Paterson, N. J.
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13
Witco Chem. Co., 122 E. 42 St., N. Y. 17

SULFONATING AND SULFATING EQUIPMENT

Chemithon Corp., 5430 Marginal Way, Seattle, Wash.
Girdler Process Equipment Div., Louisville, Ky.
G. Mazzoni, Busto Arsizio
Mecchaniche Moderne, Corso Sempione 51, Busto Arsizio, Italy
Procter & Schwartz, Inc., 7th St. & Tabor Rd., Phila.
Wurster & Sanger, 5201 Kenwood Ave., Chicago

SULFONIC ACID

Allied Chem. Corp., National Aniline Div., 40 Rector St., N. Y.
Ardmore Chem. Co., 840 Valley Brook Ave., Lyndhurst, N. J.
Continental Chem. Co., 195 21 Ave., Paterson, N. J.
Continental Oil Co., 1270 Ave. of Americas, N. Y. 20
Finetex, Inc., 418 Falmouth Ave., East Paterson, N. J.
Krystall Chem. Co., 1301 W. Belden Ave., Chicago
Monsanto Chemical Co., St. Louis, Mo.
Oronite Div., Calif. Chem. Co., 200 Bush St., San Francisco
Pilot Chemical Co., 11756 Burke St., Santa Fe Springs, Calif.
Sole Chem. Corp., 7740 S. Chicago Ave., Chicago
Sonneborn Chem. & Refining Corp., 300 Park Ave., S., N. Y.
Stepan Chem. Co., 427 W. Randolph St., Chicago
Surfact-Co., Inc., P. O. Box 114, Blue Island, Ill.

SULFONIC ACID (Cont'd.)

Tanatex Chem. Corp., Belleville Turnpike, Kearny, N. J.
Tennessee Corp., 617 Grant Bldg., Atlanta, Ga.
Textilana Cop., 12607 Cerise Ave., Hawthorne, Calif.
Treplow Chemical Co., 100 New St., Paterson, N. J.
Ultra Chem. Works, 2 Wood St., Paterson, N. J.
Witco Chem. Co., 122 E. 42nd St., N. Y. 17

SULFOXIDE

S. B. Penick & Co., 100 Church St., N. Y. 8

SULFOXYLATES (Soap Bleaches)

Antara Chemicals Div., 435 Hudson St., N. Y.
Nopco Chem. Co., 60 Park Pl., Newark, N. J.
Rohm & Haas Co., Inc., 222 W. Washington Sq., Phila.

SULFUR

Food Machy. & Chem. Corp., 161 E. 42 St., N. Y.
Freeport Sulphur Co., 161 E. 42nd St., N. Y. 17
Gulf Oil Corp., 360 Lexington Ave., N. Y. 17
Jefferson Lake Sulfur Co., Whitney Bldg., New Orleans, La.
Monsanto Chemical Co., St. Louis, Mo.
Olin Mathieson Chem. Corp., Ind. Chems., Baltimore 3
Stauffer Chem. Co., 380 Madison Ave., N. Y. 17
Texas Gulf Sulphur Co., 75 E. 45th St., N. Y.

SULFURIC ACID

Allied Chemical Corp., General Chem. Div., 40 Rector St., N. Y.
Amer. Agricultural Chem. Co., 100 Church St., N. Y.
American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
Blockson Chemicals, Joliet, Ill.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Merck & Co., Rahway, N. J.
Minnesota Mining & Mfg. Co., St. Paul
Monsanto Chemical Co., St. Louis, Mo.
Olin Mathieson Chem. Corp., Ind. Chems., Baltimore 3
Pennsalt Chems. Corp., 3 Penn Center Plaza, Phila.
Reichhold Chemicals, Inc., White Plains, N. Y.
Rumford Chem. Wks., Rumford, R. I.
Stauffer Chem. Co., 380 Madison Ave., N. Y. 17
Joseph Turner & Co., Ridgefield, N. J.
U. S. Industrial Chems. Co., 99 Park Ave., N. Y. 16
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13

SUPERFATTING AGENTS

American Cholesterol Prods., Talmadge Rd., Edison, N. J.
Archer-Daniels-Midland Co., Minneapolis, Minn.
Croda, Inc., 15 E. 26 St., N. Y.
Dragoco, Inc., King Rd., Totowa, N. J.
Emery Industries, Carew Tower, Cincinnati
Kessler Chem. Co., State Rd. & Cottman Ave., Phila. 35
M. Michel & Co., 90 Broad St., N. Y. 4
Socony Mobil Oil Co., 150 E. 42nd St., N. Y. 17
Sonneborn Chem. & Refin'g Corp., 300 4th Ave., N. Y. 10
Stepan Chem. Co., 427 Randolph St., Chicago
Robinson, Wagner Co., 628 Waverly Ave., Mamaroneck, N. Y.
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13

SURFACE ACTIVE AGENTS (see also Detergents, Synthetic; Sulfonates)

Air Reduction Chem. & Carbide Co., 150 E. 42 St., N. Y. 17
Alco Oil & Chem. Corp., Trenton Ave. & Williams St., Phila.
Allied Chem. Corp., National Aniline Div., 40 Rector St., N. Y.
American Alcolac Corp., 3440 Fairfield Rd., Balto.
American Cholesterol Prods., Talmadge Rd., Edison, N. J.
American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
American Lignite Prods. Co., Ione, Calif.
Antara Chemicals, 435 Hudson St., N. Y. 14
Archer-Daniels-Midland Co., Minneapolis, Minn.
Ardmore Chem. Co., 840 Valley Brook Ave., Lyndhurst, N. J.
Armour Industrial Chemical Co., 110 N. Wacker Dr., Chicago
Atlantic Refining Co., 260 S. Broad St., Philadelphia
Atlas Powder Co., Wilmington, Del.
Barlow Chem. Corp., Ossining, N. Y.
Blockson Chemicals, Joliet, Ill.
Carlisle Chem. Wks., Reading, O.
Chemithon Corp., 5430 W. Marginal Way, Seattle, Wash.
Clintwood Chem. Co., 33 N. LaSalle St., Chicago
Colgate-Palmolive Co., 300 Park Ave., N. Y.
Continental Chem. Co., 195 21 Ave., Paterson, N. J.
Continental Oil Co., 1270 Ave. of Americas, N. Y. 20
Commercial Solvents Corp., 260 Madison Ave., N. Y.
Dehydag Deutsche Hydrierwerke, Henkelstrasse 67, Dusseldorf, Germany
Dispergent Co., Boston St., Guilford, Conn.
Dominion Prods., Inc., 10-40 44 Dr., Long Island City
Dow Chem. Co., Midland, Mich.
E. F. Drew & Co., 15 E. 26 St., N. Y. 10
E. I. du Pont de Nemours & Co., Wilmington, Del.
Emery Industries, Carew Tower, Cincinnati
Fine Organics, Inc., 205 Main St., Lodi, N. J.
Finetex, Inc., 418 Falmouth Ave., East Paterson, N. J.
Geigy Industrial Chemicals, Ardsley, N. Y.
General Mills, Kankakee, Ill.
Glyco Chemicals Div., 417 5th Ave., N. Y.
Harchem Div., Box 178, Newark, N. J.
Hercules Powder Co., Wilmington, Del.
Hodag Chem. Corp., 7247 N. Central Park Ave., Chicago 45
Intex Chem. Corp., 167 Main St., Lodi, N. J.
Jefferson Chem. Co., 1121 Walker Ave., Houston, Tex.
Kessler Chem. Co., State Rd., Phila. 35
Klix Chem. Co., 551 Railroad Ave., S. San Francisco
Marchon Prods. Ltd., Whitehaven, Cumberland, England
M. Michel & Co., 90 Broad St., N. Y.
Minnesota Mining & Mfg. Co., St. Paul
Miranol Chem. Co., 277 Coit St., Irvington, N. J.
Mona Industries, 65 E. 23rd St., Paterson, N. J.
Monsanto Chemical Co., St. Louis, Mo.
Nalco Chem. Co., 6215 W. 66 Pl., Chicago
Nease Chem. Co., P. O. Box 221, State College, Pa.
Nopco Chem. Co., 60 Park Pl., Newark 1, N. J.
Olin Mathieson Chem. Corp., 745 5th Ave., N. Y. 22
Onyx Chemical Corp., Warren & Morris Sts., Jersey City 2, N. J.
Oronite Div., Calif. Chem. Co., 200 Bush St., San Francisco
Pennsalt Chems. Corp., 3 Penn Center Plaza, Phila.
Petrochemicals Co., 420 Lexington Ave., N. Y. 17
Pilot Chemical Co., 11756 Burke St., Santa Fe Springs, Calif.
Process Chems. Co., 8733 S. Dice Rd., Santa Fe Springs, Calif.
Quaker Chem. Prods. Co., Conshohocken, Pa.
Refined Prods. Corp., 624 Schuyler Ave., Lyndhurst, N. J.
Robinson, Wagner Co., 628 Waverly Ave., Mamaroneck, N. Y.
Rohm & Haas Co., 222 W. Washington Sq., Phila.
Rozilda Laboratories, 44-18 Purvis St., L. I. C., N. Y.
Sandoz, Inc., 61 Van Dam St., N. Y. 13
Silicones Div., Union Carbide Corp., 270 Park Ave., N. Y.
Sole Chem. Corp., 7740 S. Chicago Ave., Chicago
Sonneborn Chem. & Refin'g Corp., 300 4th Ave., N. Y. 10
Stepan Chem. Co., 427 W. Randolph St., Chicago
Surfacto Co., Box 114, Blue Island, Ill.
Swift & Co., Chicago
Synthetic Chemicals, Inc., 335 Boulevard, Paterson, N. J.
Tanatex Chem. Corp., Belleville Turnpike, Kearny, N. J.
Textilana Cop., 12607 Cerise Ave., Hawthorne, Calif.
Tennessee Corp., 619 Grant Bldg., Atlanta, Ga.
Treplow Chemical Co., 100 New St., Paterson, N. J.
Ultra Chemical Wks., 2 Wood St., Paterson, N. J.
Union Carbide Chems. Co., 270 Park Ave., N. Y.
R. T. Vanderbilt Co., 230 Park Ave., N. Y.
Van Dyk & Co., Main & Williams Sts., Belleville, N. J.
Victor Chem. Works, 155 N. Wacker Dr., Chicago
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13
Wilson-Martin Div., Snyder & Swanson, Phila.
Witco Chem. Co., 122 E. 42nd St., N. Y. 17
Wyandotte Chems Corp., Mich. Alkali Div., Wyandotte, Mich.

SURGICAL SOAPS (see Soap, Potash)

SUSPENDING AGENTS (see Emulsion Stabilizers; Foam Stabilizers)

SWEEPING COMPOUNDS

ABC Compounding Co., Oakcliff & Harwell Rds., Atlanta, Ga.
American Lignite Prods. Co., Ione, Calif.
Badger Plug Co., Appleton, Wis.
Capitol Soap Corp., Colfax Ave., Clifton, N. J.
Chem. Service of Balto., Howard & West Sts., Balto.
Chicago Sanitary Prods. Co., 3100 S. Throop St., Chicago
Fuld Bros., 702 S. Wolfe St., Baltimore
R. H. Hollingshead Corp., Camden, N. J.
Hysan Prods. Co., 930 W. 38th Place, Chicago 9
Johns-Manville Prods. Corp., 22 E. 40th St., N. Y. 16
Klix Chem. Co., 551 Railroad St., San Francisco
Midland Compound Mfg. Co., 400 W. 107th St., Chgo.
Frank Miller & Sons, 2250 W. 58th St., Chicago
North Coast Soap & Chem. Wks., Seattle, Wash.

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TREPSAN MB — *myristyl dimethyl benzyl ammonium chlorides.*
TREPSAN LQ — *lauryl isoquinolinium bromide.*
TREPSAN LCB — *lauryl dimethyl dichloro benzyl ammonium chloride.*
TREPSAN DBM — *dodecyl benzyl trimethyl ammonium chloride.*
TREPSAN OE — *alkyl-alkenyl dimethyl ethyl ammonium bromide.*

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TREPOLINE K90 — *DEA coconate condensate-concentrate.*
TREPOLINE L — *DEA lauric acid condensate.*
TREPOLINE LM-46 — *DEA lauric acid condensate-concentrate.*
TREPOLINE S-4 — *DEA coconut oil condensate.*
TREPOLINE M-3 — *DEA coconut oil condensate-concentrate.*
TREPOLINE CV 50T — *DEA coconut oil condensate.*
TREPOLINE ST — *isopropanolamine lauric acid condensate-concentrate.*

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TREPENOL AM — *ammonium lauryl sulfate — liquid — 30% active.*
TREPENOL EP — *DEA lauryl sulfate — liquid — 40% active.*

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SWEEPING COMPOUNDS (Cont'd.)

Paxon Mfg. Co., 350 State Rd., Andalusia, Pa.
Peck's Prods. Co., 610 E. Clarence Ave., St. Louis
S. & S. Soap Co., 815 E. 135 St., N. Y. 54
Southern Chemical Prods. Co., 170 Poplar St., Macon, Ga.
Surety Laboratories, 3946 Olive St., St. Louis
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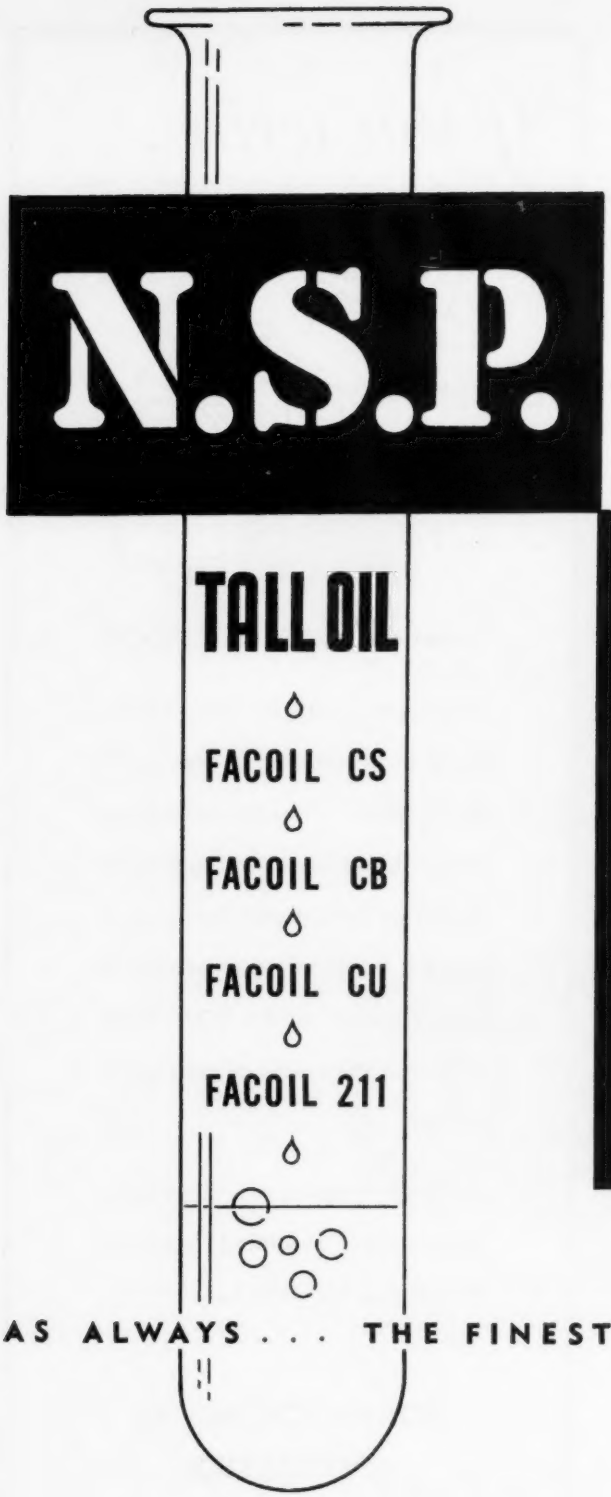

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E. I. du Pont de Nemours & Co., Wilmington, Del.
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Hercules Powder Co., Wilmington, Del.
Monsanto Chemical Co., St. Louis, Mo.
U. S. Industrial Chems. Co., 99 Park Ave., N. Y.

TRICHLORETHYLENE

Diamond Alkali Co., Union Commerce Bldg., Cleveland 14
E. I. du Pont de Nemours & Co., Wilmington, Del.
Hooker Chem. Corp., Niagara Falls, N. Y.
Millmaster Chem. Corp., 99 Park Ave., N. Y. 16
Stauffer Chemical Co., 380 Madison Ave., N. Y.
Joseph Turner & Co., Ridgefield, N. J.

TRIETHANOLAMINE (see listings under Ethanolamines)

TRIETHANOLAMINE SOAP (see Soap, Triethanolamine)

TRIETHANOLAMINE SULFONATES

American Alcolac Corp., 3440 Fairfield Rd., Baltimore
Continental Chem. Co., 195 21st Ave., Paterson, N. J.
Finetex, Inc., 418 Falmouth Ave., East Paterson, N. J.
M. Michel & Co., 90 Broad St., N. Y. 4
Onyx Chemical Corp., Warren & Morris Sts., Jersey City 2, N. J.
Pilot Chemical Co., 11756 Burke St., Santa Fe Springs, Calif.
Process Chems. Co., 8733 S. Dice Rd., Santa Fe Springs, Calif.
Sole Chem. Corp., 7740 S. Chicago Ave., Chicago
Sonneborn Chem. & Refining Co., 300 4th Ave., N. Y. 10
Stepan Chem. Co., 427 W. Randolph St., Chicago
Surfact-Co., Inc., P. O. Box 114, Blue Island, Ill.
Tennessee Corp., 619 Grant Bldg., Atlanta, Ga.
Textilana Cop., 12607 Cerise Ave., Hawthorne, Calif.
Treplow Chemical Co., 100 New St., Paterson, N. J.
Witco Chem. Co., 122 E. 42nd St., N. Y. 17

TRIPOLI (see Pumice)

TRIPOLYPHOSPHATES (see Sodium Tripolyphosphate)

TRIPROPYLENE

Amoco Chems. Corp., 130 E. Randolph Dr., Chicago 1
Atlantic Refining Co., 260 S. Broad St., Phila.
Continental Oil Co., 630 5th Ave., N. Y. 30
Enjay Chem. Co., 15 W. 51st St., N. Y. 19
Gulf Oil Corp., 360 Lexington Ave., N. Y. 17
Sun Oil Co., 1608 Walnut St., Phila. 3
Texaco, Inc., 135 E. 42nd St., N. Y.

TRISODIUM PHOSPHATE

Allied Chem. Corp., General Chem. Div., 40 Rector St., N. Y.
Amer. Agricultural Chem. Co., 100 Church St., N. Y.
Blockson Chemicals, Joliet, Ill.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Food Machy. & Chem. Corp., 161 E. 42 St., N. Y.
A. R. Maas Chem. Co., 4570 Ardine St., South Gate, Calif.
Monsanto Chemical Co., St. Louis, Mo.
Phosphorous Div., Hooker Chem. Corp., 666 5 Ave., N. Y.
Stauffer Chem. Co., 380 Madison Ave., N. Y.
Jos. Turner & Co., Ridgefield, N. J.
Victor Chemical Works, 155 N. Wacker Dr., Chicago 6
Virginia-Carolina Chemical Corp., Richmond, Va.
Welch, Holme & Clark Co., 1 Hudson St., N. Y. 13

TUBE FILLING MACHINERY (see Filling Machinery, Tube)

TUBES (Collapsible Tubes)

Aluminum Company of America, Pittsburgh
Bradley-Sun Division, 181 Long Ave., Hillside, N. J.
Walter Frank Organization, 4100 Warren Ave., Hillside, Ill.
National Collapsible Tube Co., Providence, R. I.
Peerless Tube Co., 58 Locust Ave., Bloomfield, N. J.
Sheffield Tube Co., New London, Conn.
White Metal Mfg. Co., 1012 Grand St., Hoboken, N. J.
A. H. Wirz, Inc., 2316 W. Townsend St., Chester, Pa.

TUBES and TUBING (Polyethylene, Aectate, Plastic, etc.)

Action Plastics, 48 California Ave., Paterson, N. J.
American Can Co., 100 Park Ave., N. Y.
Anchor Plastics Co., 36-36 36 St., Long Island City, N. Y.
Lusteroid Container Co., So. Orange, N. J.
Hydrawlik Co., 131 E. 1st Ave., Roselle, N. J.
A. H. Wirz, Inc., 2316 W. Townsend St., Chester, Pa.

TUNG OIL

Brazilian Industrial Oils, 82 Beaver St., N. Y.
Pacific Vegetable Oil Corp., 11455 10 St., Richmond, Calif.
Werner G. Smith, Inc., Train Ave., Cleveland
Welch, Holme & Clark Co., 1 Hudson St., N. Y.

TURPENTINE

American Turpentine Farmers Association, Valdosta, Ga.
Antwerp Naval Stores Co., Savannah, Ga.
Arizona Chem. Co., 30 Rockefeller Plaza, N. Y. 20

TURPENTINE (Cont'd.)

Continental Turp. & Rosin Corp., Laurel, Miss.
Dixie Pine Prods. Co., Hattiesburgh, Miss. (wood)
Georgia Rosin Prods. Co., Brunswick, Ga.
Glidden Co., Jacksonville, Fla.
Hercules Powder Co., Wilmington, Del.
Newport Div., Heyden Newport Chem. Corp., 342 Madison Ave., N. Y.
Phoenix Naval Stores Co., Gulfport, Miss. (wood)
West Virginia Pulp & Paper Co., 230 Park Ave., N. Y. 17

UBATOL

UBS Chem. Co., 491 Main St., Cambridge, Mass.

"UCON" (Fluorinated Hydrocarbon Propellant)

Union Carbide Chems. Co., 270 Park Ave., N. Y.

UNSCRAMBLERS, ROTARY AND STRAIGHT (for cans and bottles)

Chisholm Ryder Co., of Pa., Hanover, Pa.
Arthur Colton Co., 3431 E. Lafayette, Detroit
Emhart Mfg. Co., Portland, Conn.
FMC Packaging Machy. Div., 4972 Summerdale Ave., Phila., Pa.
Horix Mfg. Co., 2609 Chartiers Ave., Pittsburgh 4
Island Equipment Corp., 1090 E. 31st St., Hialeah, Fla.
Laub Engineering Co., 244 N. San Marino Ave., San Gabriel, Calif.
M. R. M. Co., 191 Berry St., Bklyn.
John R. Nalbach Engr. Co., 6139 W. Ogden Ave., Chicago
Pneumatic Scale Corp., Quincy 71, Mass.
U. S. Bottlers Machy. Co., 4019 N. Rockwell St., Chicago
Weigh Right Auto. Scale Co., Mills Rd., Joliet, Ill.

UREA

Allied Chem. Corp., Nitrogen Div., 40 Rector St., N. Y.
American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Hercules Powder Co., Wilmington, Del.
Grace Chemical Co., 3 Hanover Sq., N. Y.
Monsanto Chemical Co., St. Louis, Mo.
Olin Mathieson Chem. Corp., Ind. Chems., Baltimore 3
Shell Chem. Corp., 50 W. 50 St., N. Y.

USED MACHINERY AND EQUIPMENT

Irving Barcan, 249 Orient Ave., Jersey City, N. J.
Brill Equipment Co., 35 Jabez St., Newark 5, N. J.
Chemical Equipment Corp., 2401 Third Ave., N. Y.
Chemical & Process Machy. Corp., 760 Montgomery St., Bklyn.
Emsco Equipment Co., 39 Hyatt Ave., Newark, N. J.
First Machy. Corp., 209 10th St., Bklyn.
Wm. T. Hand Equipment Co., Manhasset, N. Y.
Houchin Division, 300 Straight St., Paterson, N .J.
Jasper Machy Co., 282 Sixth St., Bklyn. 15
Loeb Equipment Supply Co., 810 W. Superior Ave., Chicago
Newman Tallow & Soap Machy. Co., 3601 S. Iron St., Chicago
Perry Equipment Corp., 1515 W. Thompson St., Phila. 21 ,Penna.
Stein Equipment Co., 107-8th St., Bklyn. 15
Union Standard Equipment Co., 318 Lafayette St., N. Y. 12

VANILLIN

Aromatic Products, Inc., 235 4th Ave., N. Y.
Dodge & Olcott, Inc., 75 9th Ave., N. Y.
Dow Chemical Co., Midland, Mich.
P. R. Dreyer, Inc., 601 W. 26th St., N. Y.
Felton Chemical Co., 603 Johnson Ave., Brooklyn, New York
Florasynth Laboratories, 900 Van Nest Ave., N. Y.
Fritzsche Bros., 76—9th Ave., N. Y. 11
Givaudan-Delawanna, Inc., 321 W. 44th St., N. Y.
Geo. Lueders & Co., 427 Washington St., N. Y. 13
Magnus, Mabee & Reynard, 16 Desbrosses St., N. Y.
Maywood Chemical Div., Maywood, N. J.
Monsanto Chemical Co., St. Louis, Mo.
Norda Essential Oil & Chem. Co., 601 W. 26th St., N. Y.
Orbis Prods. Corp., 601 W. 26th St., N. Y. 1
S. B. Penick & Co., 100 Church St., N. Y. 8
Perry Bros., 61-12 32 Ave., Woodside, N. J.
Riches-Nelson, Inc., 342 Madison Ave., N. Y.
F. Ritter & Co., 4001 Goodwin Ave., Los Angeles 39
Robeco Chemicals, Inc., 25 E. 26 St., N. Y. 10
Schimmel & Co., Newburgh, N. Y.
Shulton, Inc., 630 5th Ave., N. Y.
Sterwin Chemicals, Inc., 1450 Broadway, N. Y. 18, N. Y.
Ungerer & Co., 161 Ave. of Americas, N. Y. 13
Verona Aromatics, 26 Verona Ave., Newark 4, N. J.

VAPORIZERS (Insecticide, Deodorizing, Perfuming, etc.) (see also Sprayers, Atomizing)

Allied Block Chemical Co., 428 Bingham St., Pittsburgh 3, Pa.
Gallo Co., 1312 Forest St., Racine, Wisc.
Hub States Chems. & Equipment, 1255 N. Windsor St., Indianapolis
Hysan Prods. Co., 930 W. 38th Place, Chicago 9
Keystone Scent Conditioner Corp., 315 N. 12th St., Philadelphia 7
Star Porcelain Co., 33 Muirhead Ave., Trenton, N. J.
Universal Electric Prods., 2201 Regent St., Madison 5, Wis.

WARFARIN

S. B. Penick & Co., 100 Church St., N. Y. 8
Prentiss Drug & Chem. Co., 101 W. 31st St., N. Y. 1

WARFARIN FORMULATIONS

California Spray-Chemical Corp., Richmond, Calif.
Chase Products Co., 20th St. & Gardner Rd., Broadview, Ill.
Chem. Insecticide Corp., 30 Whitman Ave., Metuchen, N. J.
Chemical Service of Baltimore, Howard & West Sts., Balto.
Geigy Agric. Chems., Ardsley, N. Y.
Hopkins Ag. Chemical Co., Madison, Wisc.
Hub States Chems. & Equipment, 1255 N. Windsor St., Indianapolis
Hysan Products Co., 930 W. 38th Pl., Chicago
S. B. Penick & Co., 100 Church St., N. Y. 8
Prentiss Drug & Chem. Co., 101 W. 31st St., N. Y. 1
Private Brands, Inc., 300 S. 3rd St., Kansas City, Kan.
Puro Co., 2801 Locust St., St. Louis 3
Residex Corp., Clark, N. J.
Sennewald Drug Co., 2721 Chouteau Ave., St. Louis
Tex-ite Prods. Corp., 859 E. 43 St., Brooklyn 10
Uncle Sam Chemical Co., 573 W. 131st St., N. Y.
U. S. Sanitary Specialties Corp,, 1001 S. California Ave., Chicago
Warsaw Chem. Co., Warsaw, Ind.

WATER CONDITIONING EQUIPMENT

Belco Ind. Equipment Co., 51 Iowa Ave., Paterson, N. J.
Illinois Water Treatment Co., 840 Cedar St., Rockford, Ill.
Permutit Co., 330 W. 42nd St., N. Y.
Terris Div., Consolidated Siphon Supply Co., 22 Wooster St., N. Y.

WATER SOFTENERS

Amer. Agricultural Chem. Co., 100 Church St., N. Y.
American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
Antara Chemicals Div., 435 Hudson St., N. Y. 14
Barlow Chem. Corp., Ossining, N. Y.
Dow Chem. Co., Midland, Mich.
Emkay Chem. Co., 319 2nd St., Elizabeth, N. J.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Geigy Industrial Chemicals, Ardsley, N. Y.
Haag Labs., 14000 Seeley Ave., Blue Island, Ill.
Hampshire Chem. Corp., Nashua, N. H.
Illinois Water Treatment Co., 840 Cedar St., Rockford, Ill.
Miranol Chem. Co., 277 Coit St., Irvington, N. J.
Mona Industries, 65 E. 23rd St., Paterson, N. J.
Nalco Chem. Co., 6216 W. 66th Pl., Chicago
Olin Mathieson Chem. Corp., Ind. Chems., Baltimore 3
Refined Products Corp., 624 Schuyler Ave., Lyndhurst, N. J.
Rohm & Haas Co., 222 W. Washington Sq., Phila.
Rozilda Laboratories, 44-18 Purvis St., L. I. C., N. Y.
Rumford Chemical Wks., Rumford, R. I.
Tex-ite Prods. Corp., 859 E. 43 St., Brooklyn 10
Ultra Chem. Wks., 2 Wood St., Paterson, N. J.

WATER STILLS (Automatic)

International Filter Co., 325 W. 25th Pl., Chicago
F. J. Stokes Corp., 5500 Tabor Rd., Philadelphia

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WAXES (Carnauba, Candelilla, Montan, etc. Do not confuse with floor wax)

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American Lignite Prods. Co., Ione, Calif.
M. Argueso & Co., 442 Waverly Ave., Mamaroneck, N. Y.

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Petrolite C-700	190 Min.	4 Max.	1½ Max.	Nil	Nil
B-Square 190 A	190-195	2-7	1½ Max.	Nil	Nil
Petrolite C-1035	195 Min.	3 Max.	1½ Max.	Nil	Nil
Petronauba C	180 Min.	7 Max.	3 Max.	22-28	50-60
Petronauba D	185 Min.	5 Max.	6 Max.	20-28	50-60
Petronauba H	195 Min.	1-3	4 Max.	15-25	50-60
Petrolite C-15	180 Min.	4-6	4-5	15-17	45-55
Petrolite C-23	180 Min.	4-6	4-5	20-15	55-65
Petrolite C-36	180 Min.	5-7	4-6	30-35	75-85
Petrolite PE-100	195-200	2-3	4-6	15-20	45-55
Petrolite R-50	190-200	2 Max.	4½ Max.	40-50	65-80
Petrolite P-20	210-220	2 Max.	3 Max.	Nil	Nil
C-6500	190-210	1-3	4 Max.	10-13	30-40
C-7500	195-215	1-3	2 Max.	10-13	25-30

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Biddle Sawyer Corp., 20 Vesey St., N. Y. 7
Candy & Co., 2515 W. 35th St., Chicago
Concord Chem. Co., 205 S. 2nd St., Camden, N. J.
T. G. Cooper & Co., Cedar & Venango Sts., Phila.
Cornelius Wax Refining Co., U. S. I., Edison, N. J.
Wm. Diehl & Co., 120 E. 56th St., New York 22
Distributing & Trading Co., 444 Madison Ave., N. Y.
Dura Commodities Corp., 20 Vesey St., N. Y. 7
Hostawax Co., 270 Sheffield St., Mountainside, N. J.
International Wax Ref. Co., E. Hawthorne Ave., Valley Stream, N. Y.
Koster Keunen, Sayville, N. Y.
Lenape Trading Co., 233 Broadway, N. Y.
Theodore Leonhard Wax Co., Haledon, N. J.
Geo. A. Miel Co., Page Ave., Lyndhurst, N. J.
Moore & Munger, 33 Rector St., N. Y.
Orbis Products Corp., 601 W. 26th St., N. Y.
S. B. Penick Co., 100 Church St., N. Y.
Pennotex Oil Corp., Box 187, Sparta, N. J.
Prentiss Drug & Chem. Co., 101 W. 31st St., N. Y. 1
Robinson Wagner Co., 628 Waverly Ave., Mamaroneck, N. Y.
Robeco Chemicals, Inc., 25 E. 26th St., N. Y.
Frank B. Ross Co., 6-10 Ash Street, Jersey City, N. J.
William H. Scheel, Inc., 38 Franklin St., Bklyn.
Smith & Nichols, Inc., 620 Central Ave., Carlstadt, N. J.
F. W. Steadman Co., 69 Pearl St., N. Y.
Strahl & Pitsch, 141 Front St., N. Y.
Strohmeyer & Arpe, 139 Franklin St., N. Y.
Arthur C. Trask Co., 4103 S. LaSalle St., Chicago
Warwick Wax Co., 2 W. 45 St., N. Y. C.
Will & Baumer Candle Co., Syracuse, N. Y.
G. S. Ziegler & Co., Great Neck, N. Y.

WAXES, PETROLEUM

Atlantic Refining Co., 260 S. Broad St., Phila.
Bareco Wax Co., Box 2009, Tulsa, Okla.
Concord Chem. Co., 205 S. 2nd St., Camden, N. J.
Continental Oil Co., 1270 Ave. of Americas, N. Y.

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Albaplex	200-205	1-2	0-2	7-10	24-28	Plastomer
Cardis Polymer #10	212-216	0-1	1-1½	8-10	25-30	Polymer
Cardis Polymer #8℗	205-210	1-2	0-2	7-10	24-28	Polymer
Cardis 935	210-214	2-3	1-1½	16-18	38-42	Polymer
Cardis One℗	195-200	1-3	0-2½	12-16	45-55	Emulsifiable Petroleum Wax
Cardis 314®	184-189	4-6	1-3	13-16	45-55	Emulsifiable Petroleum Wax
Cardis 319®	180-185	5-7	2-4	18-20	65-70	Emulsifiable Petroleum Wax
Cardis 320®	180-185	5-7	1-3	28-30	75-80	Emulsifiable Petroleum Wax
Cardis 262®	195-200	3-6	Brown	14-17	40-45	Specially Processed Petroleum Wax
Polymekon℗	195-205	0-3	Yellow	0-0	0-0	Specially Processed Petroleum Wax
Fortex®	195-200	3-4	0-2	0-0	0-0	Microcrystalline Hard & Plastic
Mekon® Brown	195-200	3-4	Brown	0-0	0-0	Microcrystalline Hard & Brittle
Mekon® Amber	195-200	3-4	6 Max.	0-0	0-0	Microcrystalline Hard & Brittle
Mekon® White	195-200	3-4	0-1	0-0	0-0	Microcrystalline Hard & Brittle
Warco® Wax 180 White	180-185	4-7	White	0-0	0-0	Microcrystalline Hard & Brittle
Warco® Wax 180 Brown	180-185	4-7	Brown	0-0	0-0	Microcrystalline Hard & Brittle
Warco® Wax 150-A Yellow	155-165	25 Max.	2 Max.	0-0	0-0	Microcrystalline Plastic
Warco® Wax 150-A Brown	155-165	25 Max.	Brown	0-0	0-0	Microcrystalline Plastic
Warcosine®	150-160	30 Max.	White	0-0	0-0	Microcrystalline Plastic
Paraffin			All Grades			Crystalline
Cane Wax 500	170-176	2 Max.	Tan	26-32	75-95	Vegetable Wax
Cane Wax 511	176-180	2 Max.	Brown	62-68	130-140	Vegetable Wax
Cane Wax 517-711	176-180	2 Max.	Black	11-14	75-85	Vegetable Wax
Cane Wax 700	171-177	2 Max.	Light Brown	26-32	70-90	Vegetable Wax

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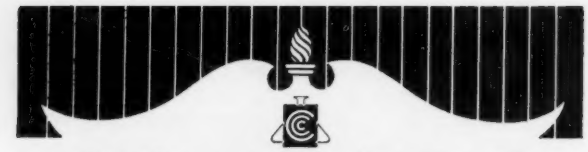

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Esso Standard Oil Co., 15 W. 51 St., N. Y.
Hostawax Co., 270 Sheffield St., Mountainside, N. J.
Industrial Raw Materials Co., 577 Madison Ave., N. Y.
International Wax Refining Corp., Valley Stream, N. Y.
Pennotex Oil Corp., Box 187, Sparta, N. J.
Pennsylvania Refining Co., Butler, Pa.
Shell Oil Co., 50 W. 50th St., N. Y.
Smith & Nichols, Inc., 620 Central Ave., Carlstadt, N. J.
Sonneborn Chem. & Refining Corp., 300 4th Ave., N. Y. 10
Standard Oil Co. (Calif.), 225 Bush St., San Francisco
Standard Oil Co. (Ohio), Midland Bldg., Cleveland
Sun Oil Co., 1608 Walnut St., Phila. 3
Texaco, Inc., 135 E. 42nd St., N. Y.
Warwick Wax Div., 2 W. 45th St., N. Y. 36

WAXES, POLYETHYLENE

Allied Chem. Corp., Plastics Div., 40 Rector St., N. Y.
American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
Eastman Chemical Prods, Inc., Kingsport, Tenn.

WAXES, MICROCRYSTALLINE (Emulsifiable)

American Lignite Prods. Co., Ione, Calif.
M. Argueso & Co., 442 Waverly Ave., Mamaroneck, N. Y.
Atlantic Refining Co., 260 Broad St., Phila.
Bareco Wax Co., 917 Enterprise Bldg., Tulsa, Okla.
Concord Chem. Co., 205 S. 2nd St., Camden, N. J.
Dura Commodities Corp., 20 Vesey St., N. Y. 7
International Wax Refining Corp., E. Hawthorne Ave., Valley Stream, N.Y.
Pennotex Oil Corp., Box 187, Sparta, N. J.
Sonneborn Chem. & Refining Corp., 300 4th Ave., N. Y. 10
Warwick Wax Div., 2 W. 45th St., N. Y. 36

WAXES, (Compounded)

Allied Asphalt & Mineral Corp., 49 Water Mill Lane, Great Neck, N. Y.
American Lignite Prods. Co., Ione, Calif.
M. Argueso & Co., 442 Waverly Ave., Mamaroneck, N. Y.
Arkansas Chem. Co., Malvern, Arkansas
Atlantic Refining Co., 260 S. Broad St., Phila.
Bareco Wax Co., 917 Enterprise Bldg., Tulsa, Okla.
Biddle Sawyer Corp., 20 Vesey St., N. Y. 7
Candy & Co., 2515 W. 35th St., Chicago 38
Cato Chemical Co., Elmhurst, Ill.
Concord Chem. Co., 205 S. 2nd St., Camden, N. J.
Cornelius Wax Refining Co., U. S. I., Edison, N. J.
Wm. Diehl & Co., 114 E. 56th St., N. Y.
Dura Commodities Corp., 20 Vesey St., N. Y. 7
Hostawax Co., 270 Sheffield St., Mountainside, N. J.
Industrial Raw Materials Co., 575 Madison Ave., N. Y. 22
International Wax Ref. Co., E. Hawthorne Ave., Valley Stream, N. Y.
Petroleum Specialties, Inc., 205 E. 42nd St., N. Y. 17
Pennotex Oil Corp., Box 187, Sparta, N. J.
Frank B. Ross Co., 6-10 Ash St., Jersey City, N. J.
Wm. H. Scheel, Inc., 38 Franklin St., Bklyn. 22
Shanco Plastics & Chemicals, Tonawanda, N. Y.
Shell Oil Co., 50 W. 50th St., N. Y. 20
Smith & Nichols, Inc., 620 Central Ave., Carlstadt, N. J.
Socony Mobil Oil Co., 150 E. 42nd St., N. Y. 17
F. W. Steadman Co., 59 Pearl St., N. Y.
Strahl & Pitsch, 141 Front St., N. Y.
Swift & Co., Hammond, Ind.
Van Dyk & Co., Main & Williams St., Belleville, N. J.
Warwick Wax Div., 2 W. 45th St., N. Y. 36
G. S. Ziegler & Co., Great Neck, N. Y.

WAXES, SYNTHETIC

Air Reduction Chem. & Carbide Co., 150 E. 42nd St., N. Y. 17
Allied Chem. Corp., Plastics Div., 40 Rector St., N. Y.
American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
American Lignite Prods. Co., Ione, Calif.
M. Argueso & Co., 442 Waverly Ave., Mamaroneck, N. Y.
Arkansas Chem. Co., Malvern, Arkansas
Armour Ind. Chem. Co., 119 N. Wacker Dr., Chicago
Baker Castor Oil Co., 40 Ave. A, Bayonne, N. J.
Bareco Wax Co., 917 Enterprise Bldg., Tulsa, Okla.
Carlisle Chem. Wks., Reading, O.
Commercial Solvents Corp., 260 Madison Ave., N. Y.
Concord Chem. Co., 205 S. 2nd St., Camden, N. J.

Improve your wax and polish formulations
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PENNOWAXES — Are especially produced and refined for the manufacture of emulsion polishes. Compare PENNOWAXES for cost, quality, uniformity. Specifications to fit your needs.

CARTOWAXES — A series of waxes manufactured for the paper industry — milk cartons, bread wrap, candy wrap, frozen package, etc.

AMORWAXES — Is a registered trade mark for a complete series of waxes for the ultimate in lamination impregnation, moisture-proofing and insulating compounds and greases.

SYNTHETIC WAXES — A complete range of high melting point waxes — 285°F to 400°F — insoluble in most solvents at low temperature. Remarkable solubilizing properties and compatible with other waxes. Ideal for processors and compounders.

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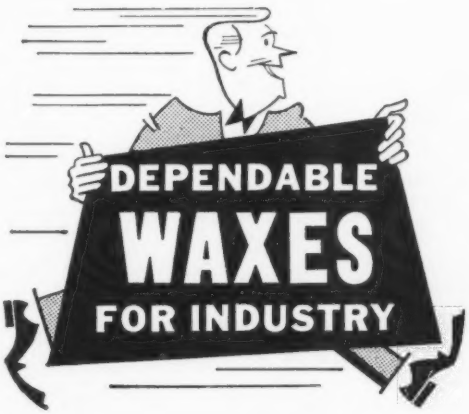
— Waxes for wax and polish formulations made by a wax manufacturer.



- **BEESWAX**
- **CERESINE**
- **OZOKERITE**
- **SYNTHETIC WAXES**

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WAX REFINING COMPANY

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VALLEY STREAM, NEW YORK

Telephone:
LOCUST
1-2500

WAXES, SYNTHETIC (Cont'd.)

Cornelius Wax Refining Corp., U. S. #1, Edison, N. J.
Wm. Diehl & Co., 120 E. 56th St., N. Y. 22
Dow Chem. Co., Midland, Mich.
Dura Commodities Corp., 20 Vesey St., N. Y.
Eastman Chem. Prods., Inc., Kingsport, Tenn.
Geigy Industrial Chemicals, Ardsley, N. Y.
Glyco Chemicals Div., 417 5th Ave., N. Y.
Hercules Powder Co., Wilmington, Dela.
Hodag Chem. Corp., 7247 N. Central Park, Chicago
Hostawax Co., 270 Sheffield St., Mountainside, N. J.
International Wax Refining Co., E. Hawthorne Ave., Valley Stream, N. Y.
Marchon Prods., White Haven, Cumberland, England
Monsanto Chemical Co., St. Louis, Mo.
Moore & Munger, 33 Rector St., N. Y.
Nopco Chem. Co., 60 Park Pl., Newark 1, N. J.
Pennotex Oil Corp., Box 187, Sparta, N. J.
Robeco Chemicals, Inc., 25 E. 26 St., N. Y. 10
Frank B. Ross Co., 6-10 Ash St., Jersey City, N. J.
Smith & Nichols, Inc., 620 Central Ave., Carlstadt, N. J.
F. W. Steadman Co., 59 Pearl St., N. Y. 17
Warwick Wax Div., 2 W. 45th St., N. Y. 36
Witco Chem. Co., 122 E. 42 St., N. Y. 17
G. S. Ziegler & Co., Box 348, Great Neck, N. Y.

WEED KILLERS (2,4-D, Chloro IPC, etc.)

Allied Chem. Corp., General Chem. Div., 40 Rector St., N. Y.
American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
American Potash & Chem. Corp., 3030 W. 6th St., Los Angeles
Atlantic Refining Co., 260 S. Broad St., Phila.
Baird & McGuire, Inc., Holbrook, Mass.
California Spray-Chemical Corp., Richmond, Calif.
Chemagro Corp., Box 4913, Kansas City, Mo.
Chipman Chem. Co., Bound Brook, N. J.
Diamond Alkali Co., Union Commerce Bldg., Cleveland
Dow Chemical Co., Midland, Mich.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Food Machy. & Chem. Corp., 161 E. 42 St., N. Y. C.
Fuld Bros., 702 S. Wolfe St., Baltimore
Geigy Agric. Chems., Ardsley, N. Y.
James Good Co., 2107 Susquehanna Ave., Phila.
B. F. Goodrich Chemical Co., 3135 Euclid Ave., Cleveland
Heyden Chem. Div., Heyden Newport Chem. Corp., 342 Madison Ave., N. Y.
Hooker Chemical Corp., Niagara Falls, N. Y.
Hub States Chem. & Equipt. Co., 1255 N. Windsor St., Indianapolis
McLaughlin, Gormley, King Co., 1715 5th St., S.E., Minneapolis
Michigan Chemical Corp., St. Louis, Mich.
Monsanto Chemical Co., St. Louis, Mo.
Olin Mathieson Chem. Corp., Baltimore 3
S. B. Penick & Co., 100 Church St., N. Y. 8
Pennsalt Chems. Corp., 3 Penn Center, Phila. 2
Pittsburgh Coke & Chem. Co., Grant Bldg., Pittsburgh
Shell Chem. Corp., 50 W. 50th St., N. Y. 20
Stauffer Chem. Co., 380 Madison Ave., N. Y.
Tex-ite Prods. Corp., 859 E. 43 St., Brooklyn
U. S. Borax & Chem. Corp., 50 Rockefeller Plaza, N. Y.
R. T. Vanderbilt Co., 230 Park Ave., N. Y.

WEIGHING EQUIPMENT (Automatic)

Arenco Mach. Co., 25 W. 43nd St., N. Y. 36
Battle Creek Packaging Machs., Battle Creek, Mich.
Consolidated Packaging Machy. Corp., 1400 West Ave., Buffalo, N. Y.
Exact Weight Scale Co., 538 E. Town St., Columbus 8, O.
FMC Packaging Machy. Div., 4972 Summerdale Ave., Phila., Pa.
J. L. Ferguson Co., Joliet, Ill.
B. F. Gump Co., 1338 S. Cicero Ave., Chicago
Laub Engineering Co., 244 N. San Marino Ave., San Gabriel, Calif.
G. Mazzoni, Busto Arsizio, Italy
Pneumatic Scale Corp., Quincy 71, Mass.
Rapids Machy. Co., Marion, Iowa
F. J. Stokes Machine Co., Tabor Rd., Phila., Pa.
Syntron Co., Homer City, Pa.
Thayer Scale Co., 1 Thayer Park, Pembroke, Mass.
Triangle Package Machinery Co., 6643 W. Diversey Ave., Chicago
Weigh Right Automatic Scale Co., Mills Rd., Joliet, Ill.
Wright Machy. Co., Durham, N. C.

WETTING AGENTS

Air Reduction Chem. & Carbide Co., 150 E. 42nd St., N. Y. 17
Alco Oil & Chem. Corp., Trenton Ave. & Williams St., Phila.
Allied Chem. Corp., National Aniline Div., 40 Rector St., N. Y.

THE Thayer SCALE

THAYER SCALE CORP.
9 Thayer Park
Pembroke, Massachusetts
TAylor 6-2371
A Subsidiary of Sundstrand Corporation

Industrial Scales, Weighing Systems and Material Handling Equipment

Greater Accuracy Through Frictionless Suspension

Unlike conventional scales, the Thayer Scale has no knife edge pivots or other friction surfaces to wear and cause inaccurate weighing. The Flexure-Plate suspension system is unaffected by dirt, shock, moisture and temperature change. Accuracy is guaranteed for millions of weighings.

Special Systems and Service

Thayer Scale offers engineering assistance in planning new or revised production processes involving weight control. Special systems include, classifying scales, formulating scales, continuous weighers, constant weight feeders, process control scales, loss-in-weight feeders, specific gravity scales, custom designed systems and special control panels.

Bagging and Batching Scales

Net and gross weighing scales for materials ranging from powdered sugar to charcoal briquettes. Bag filling rates up to 30 bags per minute with accuracy of ± 1/10 of 1%. All models employ two speed filling for greater accuracy. Belt, rotary or vibratory feeders depending upon material handling characteristics. Separate control box includes all necessary instrumentation. All components enclosed in dust tight housings. Accessories include — totalizers, predetermined counters, bag jogglers, stainless steel construction, and teflon coating to prevent hang-up of poor flowing materials.

Request Data Sheet Series 5A and 5C.

Belt Scales

For metering and totalizing applications in the food, chemical, metal and other process industries requiring continuous product flow at precise rates.
Metering scales automatically maintain preset feed rates and can control proportioning and adding of other ingredients to the process.

Totalizing scales provide accurate continuous inventory of amount of material that has passed over the scale in the process flow. Accuracy of ± 1% or better as required.

Request Data Sheet Series 5D.

Checkweighers

Precision weight inspection tools combining the accuracy of the Thayer Scale with the speed of electronic read-outs. Standard models checkweigh at speeds up to 30 units/minute with accuracy of ± ¼ ounce. Scales are furnished for weights from 1 to 500 pounds. Higher capacities available on order. Typical applications include checkweighing of automobile windshields and glass, tire treads, shoe soles, prepackaged cases, etc.

Accessories include sweep arm reject, visual and audio alarms, strip chart recorder, totalizing counters to indicate total packages weighed and total packages over/under weight.

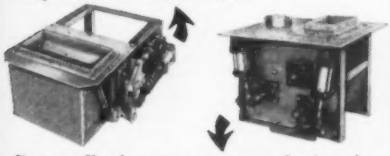
Request Data Sheet Series 5B.

Typical Operations:

1. Indicate deviation from preset limits and automatically reject over/under weight items.
2. Actuate compensating controls to correct over/under weight.
3. Code or classify products by weight.

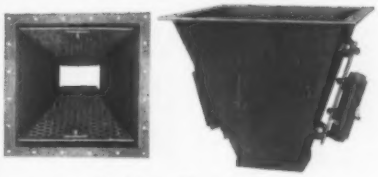
Bulk Material Feeders

Vibragate Feeders — for free-flowing, non-flooding materials such as sand, pelletized feed and plastics, etc.
Request Data Sheet 2A01.



Rotary Feeders — vane type feeders for materials that aerate and flood such as flour, P.V.C., burnt lime, confectioners sugar and powdered starch.
Request Data Sheet 2A02.

Conveyor Belt Feeders — for bulky and hard to handle materials such as granular, flaked and fibrous substances ranging up to 1½" in diameter.
Request Data Sheet 2A03.
Note: All feeders available with stainless steel construction.



Bridge Breakers

Bridge Breakers — designed to move hard to handle materials which tend to bridge, cake or otherwise obstruct free material flow. Internally mounted parallel to the bin walls, the breakers are constructed of expanded metal screens to minimize weight. Inasmuch as the motion of the vibrating screens is always parallel with the sides of the bin, the vibration does not tend to compact the material as is often the case with bin mounted vibrators. The screens are attached to externally mounted vibrators by studs and shock mounted to prevent vibration of bin and adjacent stationary equipment. Designed to individual bin configuration, the bridge breaker is available as an assembled unit with bin for attachment to customer's equipment. Breaker screens and vibrators are also supplied separately for installation in existing equipment. Stainless steel construction available.

Request Data Sheet 2A04.

WETTING AGENTS (Cont'd.)

American Alcolac Corp., 3440 Fairfield Rd., Balto.
American Cyanamid Co., 30 Rockefeller Plaza, N. Y.
American Lignite Prods. Co., Ione, Calif.
Antara Chemicals, 435 Hudson St., N. Y. 14
Ardmore Chem. Co., 840 Valley Brook Ave., Lyndhurst, N. J.
Armour Industrial Chemical Co., 110 N. Wacker Dr., Chicago
Atlantic Refining Co., 260 S. Broad St., Philadelphia
Atlas Powder Co., Wilmington, Del.
Continental Chem. Co., 195 21st Ave., Paterson, N. J.
Continental Oil Co., 1270 Ave. of Americas, N. Y. 20
Commercial Solvents Corp., 260 Madison Ave., N. Y.
Dehydag Deutsche Hydrierwerke, Dusseldorf, Germany
Dow Chemical Co., Midland, Mich.
E. F. Drew & Co., 15 E. 26 St., N. Y. 10
E. I. du Pont de Nemours & Co., Wilmington, Del.
Emery Industries, Carew Tower, Cincinnati
Finetex, Inc., 418 Falmouth Ave., East Paterson, N. J.
Geigy Industrial Chemicals, Ardsley, N. Y.
Glyco Chemicals Div., 417 5th Ave., N. Y.
Harchem Div., Box 178, Newark, N. J.
Hercules Powder Co., Wilmington, Del.
Hodag Chem. Corp., 7237 N. Central Park Ave., Chicago 45
Intex Chem. Corp., 167 Main St., Lodi, N. J.
Jefferson Chem. Co., 1121 Walker Ave., Houston, Tex.
Kessler Chem. Co., State Rd., Phila. 35
Marchon Prods. Ltd., Whitehaven, Cumberland, England
M. Michel & Co., 90 Broad St., N. Y.
Miranol Chem. Co., 277 Coit St., Irvington, N. J.
Mona Industries, 65 E. 23rd St., Paterson, N. J.
Monsanto Chemical Co., St. Louis, Mo.
Nalco Chem. Co., 6216 W. 66th Pl., Chicago
Nopco Chem. Co., 60 Park Pl., Newark 1, N. J.
Olin Mathieson Chem. Corp., 745 5th Ave., N. Y. 22
Onyx Chemical Corp., Warren & Morris Sts., Jersey City, N. J.
Oronite Div., Calif. Chem. Co., 200 Bush St., San Francisco
Pennsalt Chems. Corp., 3 Penn Center Plaza, Phila.
Petrochemicals Co., 420 Lexington Ave., N. Y. 17
Pilot Chemical Co., 11756 Burke St., Santa Fe Springs, Calif.
Process Chems. Co., 8733 S. Dice Rd., Santa Fe Springs, Calif.
Quaker Chem. Prods. Corp., Conshohocken, Pa.
Refined Products Co., 624 Schuyler Ave., Lynhurst, N. J.
Rohm & Haas Co., 222 W. Washington Sq., Phila.
Sandoz, Inc., 61 Van Dam St., N. Y. 13
Sole Chem. Corp., 7740 S. Chicago Ave., Chicago
Sonneborn Chem. & Refining Corp., 300 4th Ave., N. Y. 10
Stepan Chem. Co., 427 W. Randolph St., Chicago
Surfacto Co., Box 114, Blue Island, Ill.
Swift & Co., Chicago
Synthetic Chemicals, Inc., 335 Boulevard, Paterson, N. J.
Tanatex Chem. Corp., Belleville Turnpike, Kearny, N. J.
Tennessee Corp., 619 Grant Blvd., Atlanta, Ga.
Treplow Chemical Co., 100 New St., Paterson, N. J.
Ultra Chemical Wks., 2 Wood St., Paterson, N. J.
Union Carbide Chems. Co., 270 Park Ave., N. Y.
Van Dyk & Co., Main & Williams Sts., Belleville, N. J.
Victor Chem. Works, 155 N. Wacker Dr., Chicago
Wilson-Martin Div., Snyder & Swanson, Phila.
Witco Chem. Co., 122 E. 42nd St., N. Y. 17

WHALE OIL

Archer-Daniels-Midland Co., Minneapolis, Minn.
Murray Oil Prods. Co., 21 West St., N. Y.
Pacific Vegetable Oil Corp., 1145 S. 10 St., Richmond, Calif.
J. H. Redding Co., 17 Battery Pl., N. Y.
Werner G. Smith, Inc., 1730 Train Ave., Cleveland
Swift & Co., Hammond, Ind.

WHITE MINERAL OILS (see Mineral Oil)

WICKS

American Cork Specialties Co., 140 Junius St., Brooklyn
Applicator Co., 163 13th St., Brooklyn
Lees Moodus Mills, Inc., 268 4th Ave., N. Y.
Staron Co., 170 Broadway, N. Y.

WINDSHIELD CLEANERS (see Glass and Windshield Cleaners)

WOOD FLOUR

Becker Moore & Co., N. Tonowanda, N. Y.
Frank Miller & Sons., 2250 W. 58th St., Chicago
Natl. Sawdust Co., 69 N. 6th St., Bklyn.
Wilner Wood Products Co., Norway, Me.
Wood Flour, Inc., Winchester, N. H.

WOOD PRESERVATIVES

Allied Chem. Corp., Solvay Process Div., 61 Broadway, N. Y.
American Potash & Chemical Corp., 3030 W. 6th St., Los Angeles
Baird & McGuire, Inc., Holbrook, Mass.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Hercules Powder Co., Wilmington, Dela.
Koppers Co., Chamber of Commerce Bldg., Pittsburgh
Monsanto Chemical Co., St. Louis, Mo.
Neville Chemical Co., Pittsburgh
Reichhold Chems., Inc., White Plains, N. Y.
Reilly Tar & Chem. Corp., Indianapolis 5, Ind.
Robeco Chems., Inc., 23 E. 26 St., N. Y.
Stauffer Chem. Co., 380 Madison Ave., N. Y.
Stecker Chems., Inc., 45 N. Broad St., Ridgewood, N. J.
U. S. Steel Corp., Pittsburgh 30
Tennessee Prods. & Chem. Corp., Nashville, Tenn.
R. T. Vanderbilt Co., 230 Park Ave., N. Y.
James Varley & Sons, 1200 Switzer Ave., St. Louis
Velsicol Corp., 330 E. Grand Ave., Chicago
Witco Chem. Co., 122 E. 42 St., N. Y. 17

WOOL GREASE

American Lanolin Corp., Lawrence, Mass.
Bopf-Whittam Corp., 1135 Elizabeth Ave., W., Linden, N. J.
Croda, Inc., 15 E. 26th St., N. Y. C.
Frank G. Fanning Co., 375 Ferry St., Newark, N. J.
N. I. Malmstrom & Co., 147 Lombardy St., Brooklyn
Pfaltz & Bauer, Inc., 350—5th Ave., N. Y.
Robinson, Wagner Co., 628 Waverly Ave., Mamaroneck, N. Y.

WRAPPING MACHINERY

Battle Creek Packing Machines, Inc., Battle Creek, Mich.
Crompton & Knowles Packaging Corp., Berkshire St., Holyoke, Mass.
FMC Packaging Machy. Div., 4972 Summerdale Ave., Phila., Pa.
Hudson-Snarp Machine Co., Green Bay, Wisc.
National Equipment Co., 153 Crosby St., N. Y. 12
Newman Tallow & Soap Machy. Co., 3601 S. Iron St., Chicago (Used)
Package Machinery Co., East Longmeadow, Mass.
Pneumatic Scale Corp., Quincy 71, Mass.
F. B. Redington Co., 3000 St. Charles Rd., Bellwood, Ill.
Triangle Package Machy. Co., 6643 W. Diversey Ave., Chicago 35
Van Buren Wrapping Machy. Corp., 750 Grand St., Bklyn. 11
Wrap-King Corp., 100 Berkshire St., Holyoke, Mass.

XYLENE

Allied Chem. Corp., Plastics Div., 40 Rector St., N. Y.
Amoco Chems. Corp., 130 E. Randolph Dr., Chicago 1
Crowley Tar Prods. Co., 273 Madison Ave., N. Y. 15
Enjay Chem. Co., 15 W. 51st St., N. Y. C.
Gulf Oil Corp., 360 Lexington Ave., N. Y. C.
Inland Steel So., 30 W. Monroe St., Chicago 3
Koppers Co., Pittsburgh 19
Robeco Chems., Inc., 23 E. 26 St., N. Y.
Shell Oil Co., 50 W. 50 St., N. Y.
Signal Oil & Gas Co., Houston 12, Tex.
Sinclair Petrochems, Inc., 600 5th Ave., N. Y.
Sun Oil Co., 1608 Walnut St., Phila.

ZINC OXIDE

Aceto Chem. Co., 40-40 Lawrence St., Flushing, N. Y.
American-British Chem. Supplies, 180 Madison Ave., N. Y.
American Int'l. Prod. Corp., 136 Liberty St., N. Y. 6
American Zinc Sales Co., 120 Broadway, N. Y.
Anaconda Sales Co., E. Chicago, Ind.
J. T. Baker Chem. Co., Phillipsburg, N. J.
Chas. B. Chrystal Co., 53 Park Pl., N. Y.
Eagle Picher Co., Cincinnati 1
Harshaw Chem. Co., 1945 E. 97th St., Cleveland 6
Mallinckrodt Chemical Works, St. Louis, Mo.
Merck & Co., Rahway, N. J.
New Jersey Zinc Co., 160 Front St., N. Y.
Robeco Chems., Inc., 23 E. 26th St., N. Y.
Rohm & Haas Co., 222 W. Washington Sq., Phila.
Whittaker, Clark & Daniels, 100 Church St., N. Y.

Finer Fragrance Sells More Soap

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521 West 57th St. • New York 19, N.Y.

Leading Creators and Manufacturers in the World of Fragrance

ARGENTINA AUSTRIA BELGIUM BRAZIL CANADA ENGLAND FRANCE GERMANY HOLLAND ITALY MEXICO NORWAY SOUTH AFRICA SWEDEN SWITZERLAND U.S.A.

Sales Minded Fragrance

AND POWDERED DETERGENT

In recent years, leading soap makers have given more attention to the selection of better quality fragrances for use in soaps of all types. They recognize that good soap perfumes, expertly created and designed to perform a specific sales function, will improve consumer acceptance and assure stronger brand loyalty. With broad experience working with all types of consumer products in which fragrance plays a part, IFF is best qualified to create and produce perfumes that will achieve maximum sales acceptance for your soap product.

Because

CREATIVE ABILITY

The IFF staff of perfumers is unequalled in creative ability, in diversification and in the handling of technical problems.

RESEARCH

Chemical research on natural and synthetic materials has resulted in the development of new products and new processes which have proved to be important in the production of finer, more effective, and more economical soap perfumes

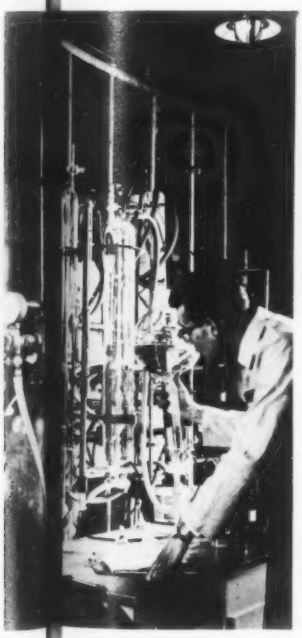
FOR TOILET SOAPS, HAND SOAPS, LIQUID AEROSOLS AND ALL CHEMICAL SPECIALTIES

QUALITY STANDARDS

The use of new instrumented techniques (vapor phase chromotography, infra-red spectrophotometry, and mass spectroscopy) provide quick and accurate analysis of each production run and permit the setting of rigid standards for raw materials as well as finished compounds.

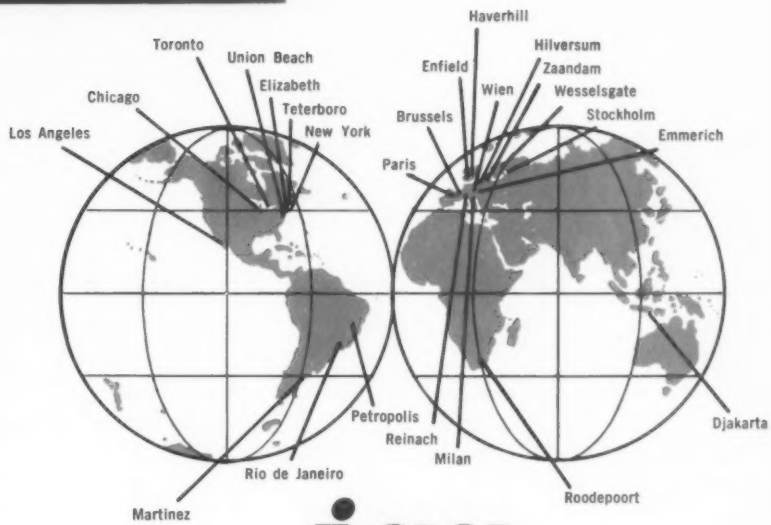
EXPERIENCE

With an unmatched record of successes in every type of product in which fragrance is used, IFF is best qualified to evaluate your needs and to suggest the right perfume needed to perform a selling function.



WORLD WIDE SERVICE

Recognizing the expanding world markets and the growing interest on the part of soap makers to produce and distribute on a world wide basis, IFF, with its production plants, reseach and creative facilities and familiarity with all of the major markets throughout the world, can provide the same helpful service and the same fine products wherever you may need them.



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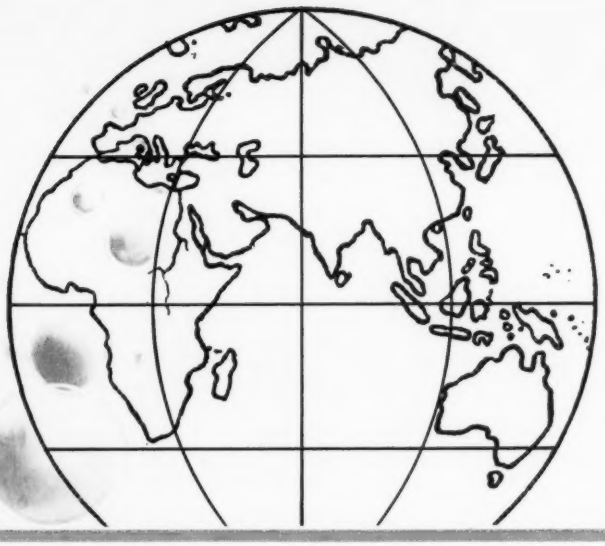

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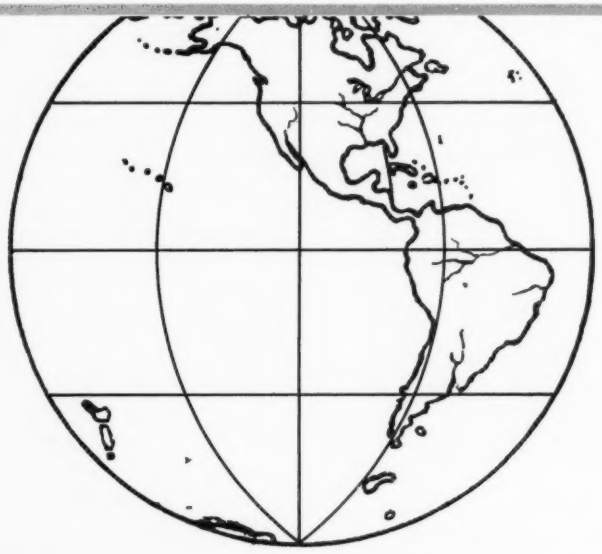

AROMATIC CHEMICALS

Utilizing the unique facilities of its six major chemical production plants, in both hemispheres, IFF produces and supplies many of the important aromatic materials required by the soap maker. In special equipment, designed by IFF engineers to achieve volume production while still retaining unequalled quality, the IFF production plants can supply superior grades of aromatic chemicals at competitive prices.

We invite your inquiries!

iff

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Reference Section

Chart of Hardness and pH Values of Water in the U. S. 236
The Peet-Grady Method 237
CSMA Textile Resistance Test 240
CSMA Aerosol and Pressurized Space Spray Insecticide Test Method 244
CSMA Cockroach Aerosol Test Method 247
CSMA Cockroach Spray Test Method 249
CSMA Chemical Analysis Test Methods 251

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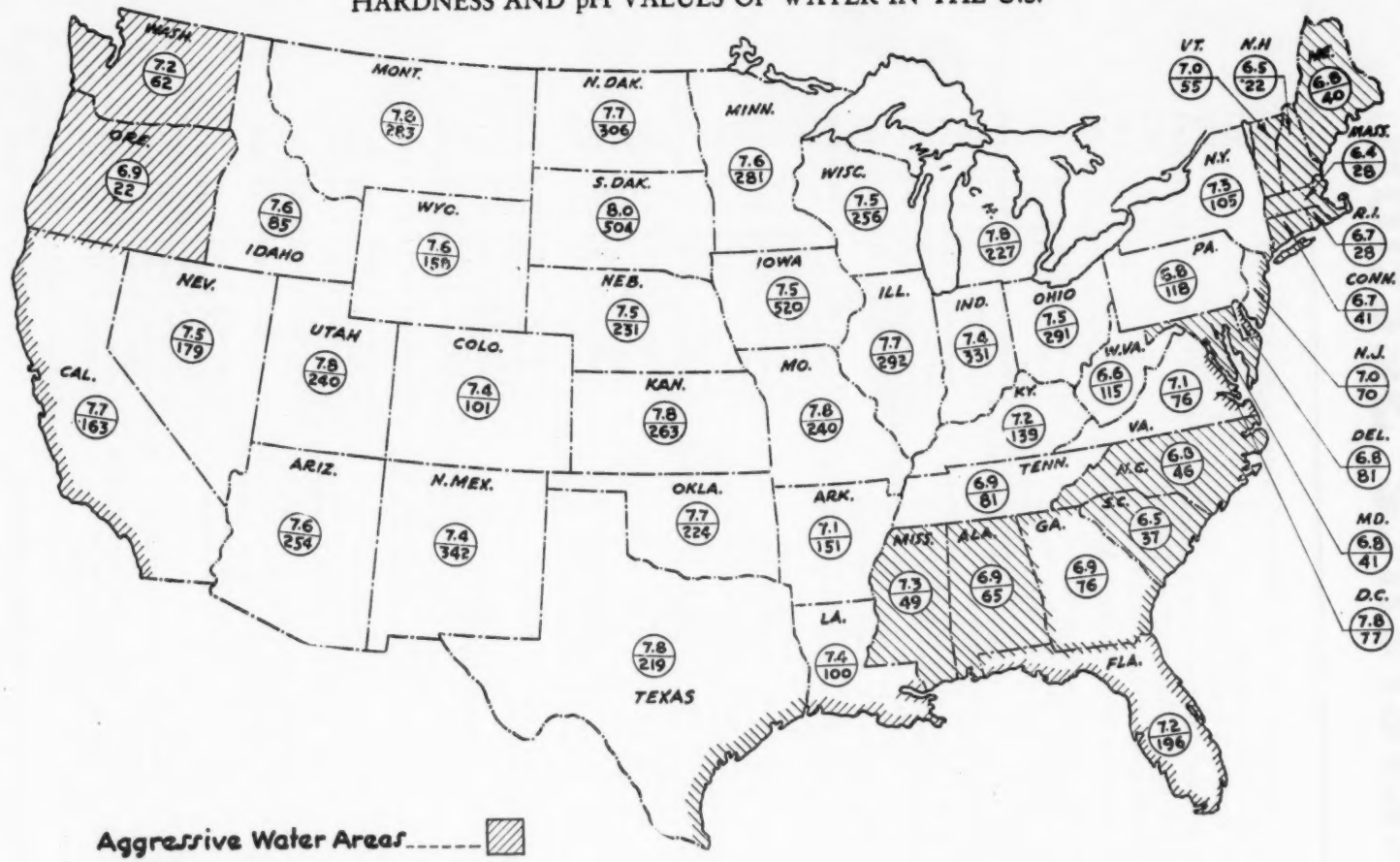
HARDNESS AND pH VALUES OF WATER IN THE U.S.*



Aggressive Water Areas _____

pH Value _____ 7.0

Hardness As $CaCO_3$ _____ 100

pH Values:- Below 7 acid
7 neutral
Above 7 alkaline

Hardness:- Below 60 ppm. aggressive water
61-120 " soft
121-180 " hard
Above 180 " very hard

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THE PEET-GRADY METHOD

Official Method of the Chemical Specialties Manufacturers Association* for Evaluating Liquid Household Insecticides, 1961 Revision — Insecticide Division, Scientific Committee

THE Peet-Grady Method was adopted as an official test in 1932, and has since been improved in certain details, all improvements have been officially accepted after thorough investigation by the CSMA Insecticide Scientific Committee. Inquiries regarding the method should be addressed to the chairman of this Committee. This method of test is a means of determining the relative efficiency of contact insecticides dissolved in fly spray base oils suitable for household and industrial use. The method does not apply to cattle sprays having viscosities materially higher than those of fly spray base oils. As a biological test it is subject to variations which accompany the reaction of living organisms and should be employed under the supervision of a person familiar with the biological testing of insecticides. In order to measure with reasonable tolerance the relative effectiveness of different insecticides, the test is designed to be used in conjunction with the "Official Test Insecticide" as the basis of comparison.

Two methods, or procedures, are permitted. The small group method is substantially the same as outlined at the time the test was adopted in 1932 while the large group method was adopted officially in 1938. Both methods are being used extensively, and if correctly employed, evaluation by either test may be expected to be in reasonable agreement.

II. APPARATUS

A. Reference Insecticide: The reference insecticide shall be the current Official Test Insecticide (OTI) prepared and sold by the CSMA, 50 E. 42nd Street, New York 17, New York. The OTI is carefully standardized by both biological and chemical analysis and it must not be diluted or changed in any manner. References to the OTI (other than in this presentation) should identify the OTI by date. The current OTI, 1959-62, is certified for use through December 31, 1962.

B. Atomizer: The Special Atomizer No. 5004, constructed by the De Vilbiss Co., Toledo, O., must be used, preferably with the DeVilbiss No. 631 or No. 647 cut off. This atomizer shall be operated with air free of contaminants and maintained at a constant pressure of 12.5 ± 0.5 pounds per sq. in. measured by a gage of not more than 30 pounds capacity or a manometer. The atomizer shall deliver 12 cc. of OTI in 24 seconds (tolerance ± 1 second) and this should be checked frequently. Atomizers failing to meet this test should be repaired by the manufacturer or replaced.

C. Test Insect: The test insect shall be the adult house fly (*Musca domestica L.*) reared from a strain mixed under the supervision of the CSMA. Flies in test groups shall be not less than 3 nor more than 6 days old at the time of testing, and must meet the Conditions for Official Evaluation, Section IV.

D. Fly Cages: Cages of any convenient type may be used if they provide at least 1 cubic inch of space per fly and at least 2 sides and the top are screened. The floor of the cage preferably is detachable, to facilitate cleaning and inserting a paper floor covering. The cages are constructed of wood or other suitable material and fly wire screening, and are fitted with a sleeve opening, rubber membrane, or a door.

E. Rearing Room: This room may be of any convenient size constructed so as to be free from strong drafts, and maintained at a temperature of 82 ± 2 degrees Fahrenheit and relative humidity of 50 ± 5 per cent. It should be separate from the testing room in order to eliminate the possibility of traces of insecticide coming in contact with the test insects. Ventilation should be provided to reduce odors and gases from fermenting media.

F. Testing Room: This room may be of any convenient size capable of holding the standard Peet-Grady Chamber and permitting adequate additional space for the operator to handle the test efficiently. While conducting tests, this room shall be maintained at a temperature of 75 to 85 degrees Fahrenheit. It is suggested that relative humidity be held between 40 and 70 per cent. Since the exhaust fan of the chamber will move relatively large quantities of air, the temperature of the air entering this room should be approximately that specified above.

G. Peet-Grady Test Chamber: The Test Chamber shall be rigidly constructed of wood, metal, or other suitable material. The inner surface shall be smooth, impervious to the usual household type of insecticide, and as free from cracks, projections, ledges, etc., as possible. The chamber shall be a 6-ft. cube by internal measurements, with a tolerance of plus or minus 1 in. for any dimension. One wall shall contain a tight-fitting door large enough for a man to enter conveniently, with the interior side flush with the wall when closed. One or more of the walls, or the ceiling, shall contain an observation window, preferably on two opposite walls. Illumination is provided by means of a glass window in the ceiling, above which is placed an electric light of such intensity as to permit flies to be observed easily. An opening covered with 10 or 12-mesh wire screen shall be connected to an exhaust fan duct and the size and the location of this opening in relation to ventilation openings in the wall must be such that thorough ventilation of the chamber is obtained. Preferably, the exhaust opening should be 1 sq. ft. or larger and located in or near the ceiling. Air inlet openings may be ports approximately 6 x 6 in. in size, covered with screen on the inside and provided with tight fitting hinged covers on the outside. Four ports located near the 4 lower corners, or 8 ports located near both the 4 upper and 4 lower corners are satisfactory, but the ventilation ports should not be on the same level as the exhaust port. The entrance door may be used alone or in conjunction with the ventilation ports if a screen door is provided and thorough ventilation of the chamber is obtained. If the temperature of the air used to ventilate the chamber is lower than 80°F., heaters may be used to obtain the temperature of 82 ± 2°F. required during the test period. Such heaters must be removed before a test is started. Openings shall be provided for the introduction of the insecticide; these must be so constructed and so located that uniform distribution of the spray is effected without undue ventilation of the chamber. These openings may be round 1 in. holes located not less than 6 in. or more than 12 in. from the ceiling and 18 in. from the nearest corner on each wall, or a single hole may be provided in the center of each wall 6 to 12 inches from ceiling.

H. Exhaust Fan: An exhaust fan moving not less than 1,000 cu. ft. of air through the chamber per min. shall be used to ventilate the chamber after each test. It shall be arranged with adequate piping to exhaust the chamber vapors outside of the building.

I. Insecticide Paper: Unsized, nonglazed absorbent paper, such as brown kraft or gray bogus, shall be used to cover the chamber floor. Two overlapping sheets of 36-40 in. width or one sheet of 6 ft. width may be employed. No special weight is specified although 60-80 lb. gray bogus paper has been found excellent.

J. Apparatus for Picking Up Flies: Any convenient means of picking up

*Chemical Specialties Manufacturers Association, 50 E. 42 Street, New York, New York, formerly National Association of Insecticide and Disinfectant Manufacturers, Inc.

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the paralyzed flies without injuring or appreciably disturbing them may be used. If a vacuum device is used, it must produce gentle suction, have a sufficiently large receptacle to prevent crowding of the flies, and it shall be cleaned after each test with the same materials used in cleaning the chamber.

III. PROCEDURE

A. Rearing and Handling Flies: In this procedure, eggs are transferred to medium suitable for the development of larvae, the pupae are collected from the medium and placed inside of cages, and the adult flies emerge and remain in these cages until the day of testing. A culture is defined as all adults resulting from the seeding of eggs collected at one time on a given date.

Larval medium: The preferred containers are cylindrical glass battery jars approximately 6 in. in diameter and 9 in. high. For one jar, mix 340 gm. (12 oz.) dry CSMA, Standard Dry Larval Medium[1] with approximately 750 cc. of an aqueous suspension containing 15 gm. moist cake yeast[2] or 5 gr. dry yeast[2] and 10 cc. non-diastic Diamalt[2]. Mix thoroughly until a loose, fluffy medium is obtained, transfer it to the battery jar without packing, cover with cloth and set in the insectary. The amount of suspension required for best rearing results will need be determined in each laboratory and it may be varied in order to prevent mold growth. It is suggested the medium be prepared in the late afternoon of the day before egg collection.

Eggs: Eggs are collected for a period not longer than 16 hours from food dishes or other oviposition media in cages containing mature flies not more than 8 days old. It is suggested that fresh oviposition medium be placed in fly cages in the late afternoon and eggs be collected early on the following morning. After collecting the eggs they must be measured and seeded without delay. Wash all the eggs together in tap water at room temperature and measure 2000 eggs as accurately as possible. This may be done by allowing the eggs to settle in a calibrated pipette or graduate (0.1 cc. settled eggs contains about 700) or the eggs can be filtered and measured in calibrated pits or cells. Use 10 cc. tap water to measure and to scatter the eggs in a pit or trench 0.5 in. deep and located in the center of the surface of larval medium. Cover the eggs with loose medium, replace the cloth covers on the jars, and set jars in the insectary so that at least 1.5 in. separates each jar to permit free air circulation. The maximum temperature in the jar (about 3 days later) must not exceed 130°F. Under normal conditions more than 85 per cent of the eggs should hatch within 36 hours of the time they are laid.

Pupae: Mature larvae migrate to the top portion of the medium and normally all larvae will have pupated by the seventh day after seeding eggs. When this occurs, the portion of medium containing pupae may be loosened, poured into a shallow tray, and air dried at room temperature. An electric fan may be used to hasten drying. Pupae may be separated from the dry medium by sprinkling the pupae-medium mixture on an inclined tray or chute set in front of an air blast such as that from an electric fan. The pupae must be handled gently and as little as possible in order to avoid injury. Any method that permits at least 95 per cent of flies to emerge is considered satisfactory.

An air separation apparatus (1) for separating pupae is used by several laboratories and found to be more rapid than the inclined tray method. The apparatus employs a blower, a cyclone collector, and a suction pipe. The device separates the heavier pupae from a layer of vermiculite placed on the surface of the fly medium before the larvae pupate. According to (2) a 2-inch layer of vermiculite should be placed on the larval medium 3 or 4 days after seeding. Six days after seeding, the mixture of vermiculite and pupae is loosened and poured on a tray and separated. Terra Lite Brand Vermiculite Soil Conditioner, available in 20-pound bags from some garden supply stores, has been found satisfactory for use in this procedure.

All of the pupae maturing on a given day are combined into one lot, mixed, and measured into test units. Each group is placed in a shallow dish which is, in turn, placed in a cage which provides at least 1 cu. in. of space per pupa.

[1]Order from Ralston Purina Co., St. Louis, Mo.

[2]Diamalt and yeasts are products of Standard Brands, Inc., and are usually available from local distributors.

TABLE I. Small Group Method

Pair	Culture	Date	% Dead Sample 1	% Dead OTI	Difference[1]	Deviation[2]	Deviation Squared
1	C	3-8	58	50	+8	+4	16
2	C	8	62	55	+7	+3	9
3	C	8	60	54	+6	+2	4
4	C	8	52	52	+0	−4	16
5	C	8	49	46	+3	−1	1
6	E	9	61	54	+7	+3	9
7	E	9	46	49	−3	−7	49
8	E	9	53	51	+2	−2	4
9	E	9	57	54	+3	−1	1
10	E	9	53	46	+7	+3	9
			55.1M	51.1M	+4 MD	0	118 Sum d²

[1]Sample 1 kill minus OTI kill.
[2]Deviation from the mean difference (MD).

The mean difference (MD) between Sample 1 kill and the OTI kill is 4.0

$$\text{The standard error MD} = \sqrt{\frac{\frac{\text{Sum } d^2}{n-1}}{\sqrt{n}}} = \sqrt{\frac{\frac{118}{9}}{\sqrt{10}}} = 1.14$$

TABLE II. Large Group Method

	CULTURE E Nov. 21		CULTURE F Nov. 23	
Cage No.	Sample	% Dead	Sample	% Dead
1	OTI	43	2	69
2	1	44	3	65
3	3	57	OTI	54
4	2	63	3	58
5	3	52	1	45
6	OTI	47	2	77
7	1	39	1	54
8	2	71	OTI	46

Sample	Mortalities	Average	Rating	Grade
OTI	43, 47, 54, 46	47.5		
1	44, 39, 45, 54	45.5	− 2.0	B
2	63, 71, 69, 77	70.0	+22.5	AA
3	57, 52, 65, 58	58.0	+10.5	A

If the large group procedure is used the test unit consists of approximately 500 pupae. If the small group procedure is used, more than 500 pupae are placed in stock cages and adult flies are sampled prior to testing. Under normal rearing conditions, at least 80 adult flies should be obtained from each 100 eggs seeded.

Adult Flies: The food for adult flies shall consist of 5 per cent spray dried, non-fat milk solids and 2 per cent granulated sugar thoroughly dispersed in water. Roller dried or caked milk solids settle out of suspension within a few hours and are unsuitable as food. A 40 per cent formalin solution may be added to the food at the rate of 1/1500 to delay souring. Each cage is supplied daily with a dish containing at least 15 ml. food for each 100 flies, and so prepared as to prevent the flies from drowning. Satisfactory food must be available to the flies at all times. The adult flies are held until the second day of oviposition (usually 12 to 14 days after eggs are seeded) when they are ready for testing.

B. Testing Flies: Before a fly spray test is started, the Peet-Grady chamber must be clean and have clean paper on the floor, all ports and openings must be closed, the temperature must be 82 ± 2°F., and all windows must be shaded equally. In both procedures, only flies which are capable of flying may be liberated into the Peet-Grady chamber. In the large group procedure all flies in one cage are used in a single test, but in the small group method a sample of 100 ± 5 flies is used in each test. Samples may be taken by liberating the flies directly into the chamber and continuing until about 10 per cent of flies remain in the stock cage. These are discarded. The order of spray treatments must be randomized as discussed in Section IV, paragraph 6.

Immediately after liberating the flies in the chamber, a total of 12 cc. of insecticide shall be sprayed in equal quantities through each spray hole. The nozzle of the atomizer shall be oscillated slowly in a horizontal plane to avoid spraying walls and ceilings and to effect uniform distribution of the spray. This procedure shall be completed within one minute from the time the spraying was started and the chamber must remain closed at a constant temperature in the range of 82 ± 2°F. for a total of 10 min. At the end of this period the ports are opened and the chamber is ventilated by means of the exhaust fan while the flies are collected.

The paralyzed flies are picked up and transferred immediately to clean cages meeting the specifications of Section II, paragraph D. These flies may be counted when they are picked up or later, depending upon which time is most convenient. During the subsequent 24-hr. recovery period, the cage is placed in the rearing room and supplied with an adequate quantity of a 5 per cent sugar solution, arranged so that the top of the dish is not more than ¾ inch above the floor of the cage and flies cannot drown in it. A gauze-wrapped ball of cotton saturated with 5 per cent sugar solution also is satisfactory.

The unparalyzed flies in the chamber at the end of the 10-min. exposure period must be counted and discarded.

After a test is completed, all toxic residues must be removed from the chamber. The paper on the floor must be renewed and the inside walls and ceiling must be cleaned thoroughly. Wiping with a clean cloth saturated with alcohol containing 10 per cent acetone or washing with soap and water will remove a number of toxic residues. However, special cleaning precautions may be required after tests with certain chemical compounds in order to remove their toxic residues. Contamination by many compounds may be detected by holding flies with food overnight in the cleaned chamber. The chamber is considered contaminated if more than 8 per cent of flies are either paralyzed in 30 minutes or are dead in the morning.

C. Assembling the Data: The number of unparalyzed flies must be counted and recorded at the end of the 10-min. exposure period. The dead flies are counted 24 hours (± 1 hr.) later preferably by removing them from the recovery cage. Only flies that show no sign of life upon being touched may be counted as dead. If paralyzed flies were counted as they were collected, the sum of paralyzed and unparalyzed flies yields the total flies in the test. If paralyzed flies were not counted as collected, the recovered flies are killed by placing the cage in an oven at 170°F. for a few minutes, after which they are counted. The sum of recovered and dead flies yields the paralyzed flies and this sum added to the unparalyzed flies yields the total flies used in the test. The mortality is the per cent dead of total flies and the knockdown is the per cent paralyzed of total flies.

IV. CONDITIONS FOR OFFICIAL EVALUATION

1. The tests shall be conducted in accordance with the procedure previously described and no official Peet-Grady rating may be assigned unless the tests meet all requirements.

2. At least 2 cultures of flies shall be used in making an official evaluation.

3. Cages showing a combined mortality and crippling greater than 15 per cent on the day of test shall not be used.

4. An unknown insecticide to be officially rated shall have a knockdown percentage equal to that of the OTI with a tolerance of minus 2.

5. The kill by the OTI shall fall between 30 and 55 per cent in all tests. The toxicty of an unknown spray shall be reported by a grade letter, obtained by subtracting the average kill by the OTI from the average kill by the unknown spray and comparing this result with the following figures:

Grade Letter		*Kill Difference*
AA	:	+16 or greater
A	:	+6 to +15
B	:	+5 to —5

6. In the small group procedure no more than 2 unknown samples may be tested in conjunction with one OTI in any one series. Ten tests are run on the OTI and on each of the unknowns in parallel; that is, test each spray the same number of times on flies of the same culture and test all sprays the same number of times on any one day. The samples of a series must be randomized in the order of testing. For example, number the samples and the OTI, and test them in the order 1, 2, 3; 2, 1, 3; 3, 2, 1, etc., until each has been tested ten times. After the mortality data are obtained, calculate the average kills and determine the difference between that of the unknowns and that of the OTI. In order for these differences to be valid, the standard error of the mean difference between the average OTI kill and the average unknown kill must be less than 3. If it is 3 or greater, the test results were too variable and to make the results valid, additional paired tests must be run to reduce the figure to a value less than 3. The example in Table I illustrates the arangement of test data and calculations described in the preceding paragraphs. When two unknown samples and the OTI are tested in series, the first table should consist of differences between Sample No. 1 and the OTI, the second table should show differences between Sample 2 and the OTI. 1.14 is less than 3, thus indicating the test has been properly conducted. The letter "n" (in the formula) denotes the number of paired tests. This number is always 10 except when it is necessary to run additional tests to reduce the standard error of the mean difference to 3 or less. The percentage kill of Sample 1 minus the percentage kill of OTI is +4; therefore, Sample 1 is a "B" grade insecticide.

7. In the Large Group procedure the evaluation is carried out as follows: The evaluation is based on the difference in mortality of the OTI and the unknown as determined by a minimum of 4 tests. The order of testing shall be random and replicated OTI tests on any culture shall agree within 10 points. Table II illustrates one arrangement of testing, the computation of the test results, and the grading of the sprays.

References

(1) Goodhue, L. D., and Linnard, C. F., 1950. Air Separation Apparatus for Cleaning Fly Pupae. Jour. Econ. Ent. 43: 228.

(2) Incho, H. I., 1954. A Rapid Method for Obtaining Clean House Fly Pupae. Jour. Econ. Ent. 47:938.

TEXTILE RESISTANCE TEST

Official Method of the Chemical Specialties Manufacturers Association* for Determining Resistance of Textiles to Insect Pests, 1961 Revision—Insecticide Division, Scientific Committee

I. INTRODUCTION

A. History: Recognizing the need for a standard method of determining the resistance of textiles to fabric pests, the CSMA Insecticide Scientific Committee began work on this problem in 1939. Early work of the Special Committee on Mothproofing was headed by Fred W. Fletcher, while later studies that led to the adoption of the tentative method in 1951 (1) were directed by George R. Ferguson. Others who were especially active in the project were committeemen E. J. Campau, H. E. Fairchild, A. H. Goddin, R. E. Heal, G. S. Kido, A. C. Miller, and F. H. Nelson. Advisory committeemen who aided were S. C. Billings, Hamilton Laudani, and W. S. McLeod. Since 1955 D. J. Ott has been chairman of the Special Committee.

A list of selected references appears at the end of this presentation. These are offered to record the more important recent committee activities and as a guide to new workers in the field of mothproofing.

B. Scope

1. These official methods of test cover biological procedures for determining the resistance to insect pests of textiles that contain wool or other susceptible fibers. The test methods described here are not concerned with the various procedures for treating textiles or with their subsequent handling, ageing, washing, cleaning, etc., but only with the biological methods to be used to measure the resistance of textiles to insect attack. The term "insect pests" shall be construed to apply to clothes moths and carpet beetles. Two procedures are covered, as follows:

a. *Excrement Weight Method*—For use only when the tests are made with carpet beetles.

b. *Fabric Weight Loss Method*—For use when the tests are made with the webbing clothes moth. This method may be used for tests with carpet beetles when the technique and results of this method are preferred or when comparative tests using both insects are made.

2. The extent of damage to the test specimens shall be determined by the excrement weight method or by the fabric weight loss method, whichever is applicable.

II. APPARATUS

A. Test Cages

The cage for conducting the tests may be any shallow glass or metal flat-bottomed container of a size large enough to permit the insects to be either in contact with or off the horizontally placed test specimen. It shall be well-ventilated and provided with a 60-mesh metal screen cover to avoid fumigating action or volatile mothproofing agents.

B. Test Insects

1. Black carpet beetle, *Attagenus piceus* (Oliv.) — Larvae shall be used from cultures maintained as in Appendix I. Larvae shall be in the weight range of 6 to 7 mg. each. Only larvae shall be used that pass through a U. S. Standard Sieve Series No. 14 sieve and are retained on a No. 16 sieve as described in App. IE.

Black carpet beetles shall be of the CSMA strain. This strain, formerly known as the Geigy Strain, was adopted as official in December, 1956, following cooperative tests with four strains (7).

2. Webbing Clothes Moth, *Tineola bisselliella* (Hum.)—Larvae shall be used from cultures maintained as described in Appendix II. Larvae shall be 25 to 27 days old as measured from the date of egg deposition to the time they are put on test. Older larvae may pupate during the test period.

3. Furniture Carpet Beetle, *Anthrenus flavipes* Lec.—Larvae shall be used from cultures maintained as described in Appendix III and may be used as alternative test insects with the black carpet beetle. Larvae shall be approximately nine weeks old when put on test as measured from the time of egg deposition. The feeding propensities of the two species are similar.

4. Other Species—Other species of fabric pests may be used for obtaining supplementary data insofar as the test methods herein described are applicable.

C. Test Specimens

1. Fabrics — Specimens, each with 2 sq. in. area shall be cut from widely-spaced portions of the fabric.

2. Yarns—Test specimens of each yarn shall be prepared by uniformly winding one layer of yarn on a square or rectangular piece of glazed cardboard, glass or metal with an area of 2 sq. in. The surface of the glazed cardboard, metal or glass shall be substantially covered by the yarn.

3. Carpets—Test specimens, each with an area of 2 sq. in., shall be cut from widely-spaced portions of the carpet. The edges of the specimens shall be secured by coating the backing yarns with cellulose nitrate dissolved in acetone. For the weight loss method, specimens shall be prepared by stapling pieces of yarn removed from the specimen to pieces of glazed paper, each having an area of 2 sq. in. so that the surface is covered substantially by the yarn.

4. Control Specimens for Insect Activity—Control specimens of the standard pure, undyed, scoured wool fabric (Note 1), each having an area of 2 sq. in., shall be exposed under the same conditions as the test specimen. If the fabric or yarn to be tested has been treated with some form of insecticide for the purpose of increasing its resistance to insect pests, specimens of the same fabric or yarn in the untreated condition should be exposed for comparison, if possible.

5. Number of Test Specimens—The number of test specimens required is given under the respective methods of test.

6. Condition of Test Specimens—The test specimens shall be free of volatile solvents or other carriers used in the application of the treatment, and free of any solvents or auxiliary agents used in any subsequent durability test.

7. It is important that various lots of fabric for control specimens and lots of fabric and other materials used as rearing medium be thoroughly checked to determine their suitability prior to use.

III. TEST METHODS

A. Excrement Weight Method

(Applicable for Tests with Black Carpet Beetle and Furniture Carpet Beetle)

1. Procedure

a. At least four test and four control specimens shall be prepared in accordance with IIC.

b. Each test specimen and control specimen shall be freed of any loosely adhering dirt or dust and placed face down in a separate test cage. Ten larvae, as specified in IIB, shall be used for each test. The larvae shall be placed on the surface of the specimen, and the cage covered as specified in IIA.

c. Incubation—The cages containing the test specimens and larvae shall be held for 14 days at a temperature of 80 plus or minus 2° F. and a relative humidity of 55 plus or minus 5 per cent. Light shall be excluded.

2. Determination of Damage and Insect Survival

a. The extent of the damage to the test specimens shall be determined by the quantity of excrement deposited.

b. The quantity of excrement deposited during the test period shall be determined as follows:

(1) Remove and record living and dead insects. Survival counts shall be made in all cases, as they are important in demonstrating the vitality of the test larvae.

(2) Remove test specimen from cage and by alternately tapping and brushing transfer all loose material,

*Chemical Specialties Manufacturers Association, 50 E. 42 St., New York, N.Y., formerly National Association of Insecticide and Disinfectant Manufacturers, Inc.

(Note 1—The standard fabric may be purchased from Testfabrics, Inc., 55 Van Dam St., New York 13, N.Y. Specify AATOC moth test cloth.)

excrement, exuviae, etc., back into the test container.

(3) Transfer contents of cage into a No. 5 Gooch crucible, and by repeated tapping of the crucible, the excrement shall be sifted through the perforations into one of a pair of matched watch glasses.

(4) The weight of excrement is determined by using an analytical balance having a minimum sensitivity of 0.2 mg. For the purpose of this test, all material that sifts through the perforations of the Gooch crucible shall be construed as excrement.

3. Report

a. The report shall include the following information for each test specimen of the treated sample and the untreated controls:

(1) Weight of excrement in milligrams.

(2) Number of larvae alive.

b. The test sample shall be considered satisfactorily resistant to carpet beetles if an average quantity of excrement of not over 5 mg. per specimen is deposited, provided that no single specimen shall show more than 6 mg. of excrement and that under the same conditions the controls shall show an average quantity of excrement of not less than 15 mg. per specimen.

c. The test shall be invalid if the quantity of excrement deposited on the control specimens averages less than 15 mg. per specimen, or if less than 90 per cent of the control larvae survive.

B. Fabric Weight Loss Method

(Applicable for Tests with Carpet Beetles and Clothes Moths)

1. Procedure

a. Test Specimens—Two sets of at least 8 specimens each, one set from the material to be tested and the other from the standard control fabric (Note 1) shall be prepared in accordance with IIC. Four specimens of each set shall be used for feeding tests, and the other four used as humidity controls.

b. Humidity Control Test — Four specimens from each set shall be exposed to the same test conditions as the specimens used for feeding tests except that no larvae shall be added. A change in weight of the humidity check specimens is due to change in moisture content only and shall be used to correct the weights of the feeding test specimens for moisture changes. (This method of humidity correction cannot be relied upon to correct for wide variations in humidity during the observation period.)

c. First Weighing — The test specimens and humidity control specimens shall be freed of any loosely adhering dirt or dust and placed in the test cages under controlled humidity and temperature conditions IIIA1c for at least 48 hours before weighing. They shall be weighed under the same conditions as specified in IIIA2 (4). The order of weighing shall alternate between test specimen and humidity control specimen, and the same order of weighing followed at the second weighing IIIB2b(3).

d. Incubation — Ten larvae as specified in IIB shall be placed on each test specimen and the test containers covered as specified in IIA. The test cages and humidity check cages are held for 14 days as specified in IIIA1c.

2. Determination of Damage and Insect Survival

a. The extent of the damage to the test specimens shall be determined by the loss of weight of the test specimens caused by the feeding of the larvae.

b. The weight loss at the end of the test period shall be determined as follows:

(1) Remove and record living and dead insects IIIA2b(1).

(2) Specimens shall be brushed to free them of all loose material, such as excrement, webbing, cast skins, loose fibers, etc. Forceps usually are necessary to remove masses of webbing and excrement from clothes moth test specimens and containers.

(3) Second Weighing — Cleaned test specimens and control specimens and the humidity check specimens shall again be weighed in accordance with IIIB1c, after the test samples have been reconditioned at controlled temperature and humidity for at least 24 hours after cleaning and removal of insects.

(4) Loss of weight—Loss of weight, in milligrams, due to feeding of the test larvae, as adjusted for humidity changes, shall be calculated as follows:

$$L = \frac{AC}{B} - D$$

where:

L = adjusted loss of weight in milligrams due to insect feeding.

A = average weight of the four test specimens before testing.

B = average weight of the four humidity check specimens before testing.

C = average weight of the four humidity check specimens after testing.

D = average weight of the four test specimens after testing.

The above formula is applicable regardless of whether the humidity check specimens gain or lose weight.

3. Report

a. The report shall include the following for the treated sample and the untreated control:

(1) Loss of weight in milligrams.

(2) Number of larvae alive.

(3) Number of larvae pupated.

b. The test sample shall be considered satisfactorily resistant to the insect pests used if the average loss of weight due to feeding is not more than 8 mg., provided that under the same conditions the average loss in weight of control specimens is 30 mg. or more. No individual specimen shall show more than 10 mg. loss of weight.

c. The test shall be invalid if the amount of feeding results in less than 30 mg. average weight loss per control specimen or less than 75 per cent of the control larvae survive.

d. Individual weight records of test specimens and humidity checks before and after the test may be reported if desired. Humidity checks should show no more than 5 per cent variation in weight before and after the test.

4. Referee Test

a. In the event of dispute, a disinterested laboratory shall conduct the tests as follows:

(1) Weight loss methods shall be used for both carpet beetles and clothes moths.

(2) The number of test specimens shall be doubled.

(3) All other conditions heretofore set forth shall apply.

(4) The results of the referee test shall be final.

APPENDIX I.

Procedure for Rearing and Handling the Black Carpet Beetle

A. Scope

The standardized procedure for rearing test insects is an essential part of the standard test procedure for determining resistance of fabrics to insect pests. The following procedure is to be used for rearing the CSMA strain of the black carpet beetle, *Attagenus piceus* (Oliv.).

B. Rearing Containers

Any suitable type of container, such as mason jars, battery jars, tin cans, with filter paper, screen or cloth covers, may be used for rearing the larvae of the black carpet beetle.

C. Rearing Medium

1. The following medium is specified:

a. Purina Laboratory Chow Meal (Note 2) which passes through U. S. Standard Sieve Series Screen No. 16 with coarse fraction discarded, or

b. 95 per cent by weight Gaines Dog Meal (Note 3) ground to pass Screen No. 20 plus 5 per cent dry brewer's yeast (Note 4).

2. Sterilize the medium to kill mites or insects that may be present. This may be done by an efficient fumigant (1 ml. carbon disfulfide per gallon, preferably in sealed glass containers for one week), (dry heat 176°F. for 4 hours or 212°F. for 1 hour) or wet heat (15 psi steam for 15 minutes). Fumigated medium must be spread in shallow trays and aired in a ventilated hood for one or more days before use. Overheating may destroy the food value of the medium.

3. Sterile medium should be stored in sealed containers. Before using, dry the medium, and adjust to 13

(Note 2—Order from Ralston Purina Company, St. Louis 2, Missouri.)

(Note 3—Available locally or from General Foods Corporation, Box 60, Youngstown 1, Ohio.)

(Note 4—Yeasts which have proven satisfactory are (a) Brewer's Yeast Powder, Mead Johnson & Company, available at most drug stores, (b) Dry Brewer's Yeast, U.S.P. from Yeast Products, Inc., 455 Fifth Avenue, Paterson, New Jersey, with minimum potency, per gram of 150 micrograms Thiamine, 45 micrograms Riboflavin and 400 micrograms Niacin.)

per cent moisture by adding distilled water.

a. Drying — Spread a quantity of medium to a depth of one-half to three-fourths of an inch in trays and dry to constant weight (30 to 44 hours) in a forced draft oven at 150°F. Cool the medium and temper to 13 per cent moisture immediately.

b. Tempering to 13 per cent moisture—Determine the total weight of the medium and for each 100 grams, prepare 15 ml. distilled water plus 0.38 ml. propionic acid (mold inhibitor). Sieve the medium through a No. 20 screen. Add the combined water and propionic acid to the coarse fraction retained on the screen. Mix thoroughly and continue to mix while adding the fine material that passed through the No. 20 screen. Finally, pour from tray to tray several times, pass through a No. 16 screen, and place in sealed containers until needed for cultures. The final mixture should contain 13 per cent moisture and 0.33 per cent propionic acid.

D. Insectary Conditions

The rearing room or incubator should have a constant temperature of 80° plus or minus 2° F. and a relative humidity of 55 plus or minus 5 per cent.

E. Maintenance of Cultures

1. It is possible to maintain cultures of the black carpet beetle so that larvae of testing size and age are available at all times. This can be accomplished only when overcrowding is prevented and cultures are kept well supplied with food.

2. The black carpet beetle completes its life cycle in 8 to 10 months when reared and handled under optimum conditions, as follows:

Once each week, pass maturing stock larvae cultures through a U. S. S. Sieve Series Screen No. 16 and collect adults and pupae separately. The majority of the pupae and the mature larvae can be seperated by spreading them out on Kraft paper. The larvae tend to cling to the paper when it is rolled and tilted to an upright position over a pan. The pupae fall into the pan and then the clinging larvae can be shaken into another pan. A No. 8 screen is useful for separating the small number of larvae still remaining with the pupae. The pupae are to be kept in a screen-covered jar for one week for emergence. Collect the adults emerged from the pupae collected the previous week and add to those collected from stock after discarding all deformed specimens. Count out 50 adults at random and measure their volume in a 15 ml. centrifuge tube. The volume of 50 adults should be 1.2 to 1.5 ml. if they have developed normally. Transfer the adults to a pint jar three-fourths full of medium (containing 13 per cent water). Cover the jar with a filter paper lid, and set it aside to age.

3. The majority of eggs are laid during the next 10 days, and these hatch 6 to 12 days after laying. The eggs are too fragile to be handled without injury and the jar must not be disturbed for at least 11 weeks. At this time, pass its contents through a No. 20 screen. A gentle stream of air, such as is produced by a hair dryer, is useful in removing cast skins. The larvae and coarse material (dead adults, coarse food particles, etc.) retained on the No. 20 screen are then separated by placing the material on the high end of a sloping platform (Ref. 11) or tray. By putting a light over this end, the larvae, since they are negatively phototropic, will crawl away from the coarse material and collect at the other end of the tray. The collected larvae are then allowed to crawl through nested No. 14, No. 16 and No. 20 screens under a light. After 5 minutes, the contents of the screens can be emptied into separate trays. Larvae caught in the mesh are gently stimulated with a soft brush to crawl through the screen or they can usually be removed without injury with a Ward's featherweight entomological forceps. Mites may be removed from larvae, pupae, or adults by placing the infested insects in a jar that is half filled with sterilized rearing medium and rotating the jar, screening to separate larvae from the medium, and destroying or sterilizing this food which contains mites. It may be necessary to repeat this procedure several times.

4. Measure the volumes of larvae collected in a centrifuge tube and estimate the percentage represented by each fraction, based on total numbers. For this purpose, 1 ml. contains approximately 45 larvae held on a No. 14 screen, 70 larvae held on a No. 16 screen, and 90 larvae held on a No. 20 screen. The number of larvae passed through the No. 20 screen should be estimated roughly and made a part of the total. If 10 to 20 per cent of the larvae are not of a size to be held on the No. 14 screen, return all fractions of the larvae and medium to the same jar and age one or two weeks longer. The above step is quite important if satisfactory test larvae are to be obtained. When the jar first produces 10 to 20 per cent of larvae held on the No. 14 screen, collect 6 ml. of the larvae held on the No. 16 screen (approximately 400), pass them through sterile medium to remove mites, and transfer to quart jar three-fourths filled with medium. Save the remaining larvae held on the No. 16 screen for tests and discard the larvae held on the No. 14 and the No. 20 screens. Add 6 ml. of larvae held on a No. 16 screen from new cultures on each of the following three weeks before starting a new jar. These are stock larvae cultures, which will produce pupae 6 to 8 months later. Three months and five months after starting the stock cultures, remove larvae from medium by a No. 16 screen as described in 3, above, and transfer to fresh medium.

5. At the time the stock larvae are collected, test larvae may be collected by means of the No. 14 and No. 16 screens. Larvae held on the No. 16 screen are test size, and average 6 to 7 mgs. in weight. The unused larvae held on the No. 16 screen can be saved for possible use as test larvae that same week. All remaining larvae should be discarded at the end of the week.

6. A few weeks' experience will determine the age of cultures meeting the requirements for sizing and use of larvae. A deviation of more than one week from the age indicates an abnormal rearing condition which may be caused by food, mites, or various other environmental or handling conditions. Abnormal cultures should be discarded.

APPENDIX II.
Precedure for Rearing and Handling the Webbing Clothes Moth

A. Scope

The following procedure is to be used for rearing and handling the webbing clothes moth, *Tineola bisselliella* (Hum):

B. Rearing Containers

Wide-mouth glass jars of 1-qt. or ½-gal. capacity are suggested. The flat lid shall be replaced by coarse filter paper and held in place by the ring used to fasten the discarded lid. Other types of containers of similar size are satisfactory.

C. Oviposition Cage

Adult moths are placed in a pint jar containing 4 to 6 squares of clean, all-wool fabric 3" x 3". Allow these adults to deposit their eggs on these pieces of fabric for 2 to 4 days. At the end of this period remove the adults and destroy. Since the eggs hatch in 4 days, this is the maximum interval that may be allowed between egg collections.

Another type of oviposition cage that is used by some laboratories is patterned after that described by Heal (Ref. 8). It consists of a widemouthed tin can 6.5 inches high and 6 inches in diameter. The bottom is removed and replaced with 16 mesh screen wire. Woolen flannel is placed beneath the screen and supported in place by a cardboard circle fastened with masking tape to the rim of the can. A closure for the culture jars is soldered in place in an inverted position in the center of the lid of the can and an opening 2 inches in diameter is cut in the can lid within the area enclosed by the closure. A culture jar with emerging adults is fastened in place in the closure and a bright light shined on the glass culture jar to drive the adults into the oviposition cage. At intervals of not more than 4 days, the flannel can be removed and the eggs collected by dislodging with a stiff brush and handled as described in F. below.

D. Rearing Medium

Use clean, scoured, undyed wool cloth (Note 5.) supplemented with about one teaspoonful of autoclaved dry brewer's yeast to each 30 grams of cloth. Refer to App. IC2 for instructions on autoclaving yeast.

E. Insectary Conditions

(See App. ID.)

(Note 5—No. 3 Special Filter Cloth from Mechanical Felt and Textiles Co., 50 W. 18th Street, Weehawken, New Jersey, and No. 70105 All-Wool Felt Color 10 White, from The American Felt Co., 315 Fourth Avenue, New York, New York, have been used satisfactorily with the Heal type oviposition cage. Specific fabrics are to be used for rearing moths and must be free of insecticides.)

F. Maintenance of Culture

The adults in mature cultures shall be transferred to the oviposition cage either by suitable suction or by introducing into the container with the adults a small amount of CO_2 gas. The adults can then be removed from the container and transferred to the oviposition jar without difficulty. 400 to 500 adult webbing clothes moths will deposit approximately 4,000 eggs in two to four days. The 3" x 3" pieces of fabric are then placed in an enamel pan and vigorously brushed with a ½-inch glue brush to remove the eggs. The eggs are screened through a 40-mesh sieve and retained on a 60-mesh sieve. The eggs are measured in a graduated centrifuge tube, 0.2 ml. representing approximately 4,000 eggs. These are sprinkled on 4" x 10" strips of clean scoured wool fabric (total 25-30 grams wool) treated with about a teaspoonful of dry yeast. The roll of wool strips is then placed in a one- or two-quart, wide-mouth jar, covered with filter paper lid, and kept under conditions described in App. ID until of test age. Some workers wrap the roll of wool strips in a 5" x 15" strip of wool felt to give it more support in the rearing jar.

APPENDIX III.
Procedure for Rearing and Handling the Furniture Carpet Beetle

A. Scope

The following procedure is to be used for rearing and handling the furniture carpet beetle, *Anthrenus flavipes* LeC:

B. Rearing Containers

(See App. IIB.)

C. Rearing Medium

(See App. IID.)

D. Insectary Conditions

(See App. ID.)

E. Maintenance of Cultures

1. Place approximately 60 pupae in a rearing jar (App. IB) with several 3-inch squares of wool cloth supplemented with dry brewer's yeast or fish meal.

2. Examine rearing jars at weekly intervals and provide sufficient supplemented wool cloth to maintain an adequate food supply.

3. About eleven weeks after the pupae were placed in the rearing jars, the larvae are removed from the wool cloth, excrement, pupal cases, etc. After removing the excrement and excess brewer's yeast with a 40-mesh sieve, larvae clinging to the cloth can be removed with a soft brush. If handled carefully, the larvae may also be transferred with a light forceps.

4. The collected larvae are then allowed to crawl through nested No. 14, No. 16, and No. 20 screens under a light. The larvae held on the No. 20 screen are test size and average 1.0 to 1.5 mgs. in weight. If more than half of the larvae pass through the No. 20 screen, return all fractions of the larvae and medium to the same jar and age one week longer. A few weeks experience will determine the age of cultures meeting the requirements for sizing and use of larvae.

5. A portion of the larvae not used for tests can be placed in a large stock jar which serves as a source of supply of pupae for the rearing jars.

Addendum

It should be noted that in this test method the criteria for determining the acceptability or unacceptability of a mothproofing treatment are limited to the strictly quantitative excrement weight and fabric weight loss measurements. Although visible damage ratings can be used under certain conditions, they are not suitable for a standard method which must necessarily be used under a wide range of conditions; e. g., visible damage ratings would not give reliable results when (1) more than one type of material is involved, and (2) when comparing the results of different investigators.

Mothproofing treatments submitted to the U. S. Department of Agriculture's Pesticide Regulation Section for acceptance of label claims are subjected to a variety of tests, depending on the type of formulation proposed and the type of moth protection to be obtained. Usually a forced feeding test (similar to the CSMA Textile Resistance Test) is included and treatments are considered satisfactory if they do not show visible damage. Those treatments that do show visible damage in this forced feeding test are subjected to a long-term room exposure test. Lack of visible damage in this semi-practical test is the final criterion of the acceptability of the treatment.

Laboratories using the CSMA Textile Resistance Test with the intention of submitting results to the Pesticide Regulation Section are cautioned to take notes on visible damage. Reports on visible damage may be requested in addition to the reports on excrement weight and fabric weight loss.

Discussions with the Pesticide Regulation Section as to the detailed requirements for testing are always desirable.

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AEROSOL AND PRESSURIZED SPACE SPRAY INSECTICIDE FOR FLYING INSECTS

Official Method of Chemical Specialties Manufacturers Association* for Evaluating Aerosol and Pressurized Space Spray Insecticides Against Flying Pests, 1961 Revision—Insecticide Division, Scientific Committee

I. INTRODUCTION

Early in the developmental period of liquefied gas aerosols, starting in 1942 and especially following their appearance on the civilian market on a large scale in 1946, the need for a common method of biologically assaying aerosols became apparent. The literature records several testing techniques (among them 1, 2, 3, 4, and 7) employed by various investigators at that time, but the necessary cooperative tests leading to the development of an official method were not initiated until 1947. The first series of cooperative aerosol tests among industrial and federal laboratories was organized and conducted in 1947 under the direction of the NAIDM Aerosol Committee (8). These tests employed a standard formulation in a standard dispenser at three dosage levels by the method in current usage in the cooperator's laboratory. Employing the results of the first cooperative tests as a basis, a second series of cooperative tests was designed and conducted under the direction of the NAIDM's Insecticide Scientific Committee. In this second series of tests made during the period May to October 1948, four conventional low pressure aerosol formulations, each packaged in a standard dispenser, were tested by nine cooperating laboratories. In these tests (9) the use of free flying flies, a standard dosage and a standard testing technique were employed. A third series of cooperative tests were conducted by ten participating laboratories. These tests (10) made use of three coded formulations containing 0.2%, 0.4%, and 0.8% pyrethrins. The method here presented is based on the outcome of the first, second, and third series of cooperative tests, and insofar as practical follows the Official Peet-Grady (11) Test Procedure (both large and small group). This technique for testing aerosols should be regarded as a practical test method designed for the comparison of formulations in the dispensers in which they will be employed by the consumer. It is restricted at present for the use against house flies, although it is felt that with modifications in dosage the general procedure would be satisfactory for other flying insects.

With the growth of pressurized insecticides between 1949 and 1958, it was felt by the CSMA that a grading system and a distinction between aerosols and the newly developed pressurized space sprays should be made. In view of the changing trade practices, therefore, definitions (12) of aerosols and pressurized sprays, and a grading system are now incorporated in this method. Grading of aerosols and presurized sprays is set forth under Section IV Conditions for Official Evaluations, and definitions for aerosol and pressurized sprays are as follows:

1. Aerosols: The spray from aerosol dispensers should be in finely divided form in which 80 percent or more of the individual spray particles have a mean diameter of 30 microns or less, and none of the spray particles has a diameter of more than 50 microns. Aerosols must be no less effective in biological performance (5-minute, 10-minute, and 15-minute knockdowns and 24-hour mortality) than the Official Test Aerosol (OTA) when tested against house flies at the same dosage or less.

2. Pressurized Sprays: These products deliver mist sprays intermediate between aerosol-type sprays and those which are intended to deposit an insecticidal residue of a chemical. They must be no less effective in biological performance (15-minute knockdown and 24-hour mortality) than the Official Test Aerosol (OTA) when tested at no more than twice the dosage specified for the OTA.

II. APPARATUS

A. Reference Insecticide: The reference insecticide shall be the current Official Test Aerosol (OTA) prepared by the CSMA, Inc. The OTA must be dispensed from the container in which it is supplied, with particular care being taken that the OTA dispenser employed meets the specifications designated on its label. References to the OTA (other than in this presentation) should identify the OTA by date.

B. Dispenser for Experimental Insecticide: No restriction is made on the dispenser employed in connection with the experimental aerosol or other pressurized formulations. However, it should be noted that the test results apply only to the experimental formulation as dispensed from the particular unit employed. In reporting results, the dispenser used shall be specified.

C. Test Insect: The test insect shall be the house fly (*Musca domestica* L.) reared from strains mixed under the supervision of the CSMA. Healthy test groups having an average age of four days shall be used and individual flies in the test groups shall be not less than three nor more than six days old at the time of testing. The strain shall be of such susceptibility that the Official Test Insecticide (OTI) will cause a 24-hour mortality of 30 to 55 per cent and with approximately 95 per cent of the flies paralyzed at ten minutes following spray application by the Peet-Grady method (11).

D. Fly Cages: Cages of any convenient type may be used if they provide at least 1 cubic inch of space per fly and have at least two sides and the top screened. It is suggested that the base be square in shape to provide maximum floor space. The floor of the cage is preferably detachable to facilitate cleaning and inserting a paper floor covering. The cages are constructed of wood or other suitable material and 16-mesh wire screening; they are fitted with a sleeve opening, rubber membrane, or a door.

E. Rearing Room: This room may be of any convenient size, constructed so as to be free from strong drafts, and maintained at a temperature of 82 ± 2 degrees Fahrenheit and relative humidity of 50 ± 5 per cent. It should be separate from the testing room in order to eliminate the possibility of traces of insecticide coming in contact with the test insects. Ventilation should be provided to reduce odors and gases from fermenting media.

F. Testing Room: This room shall be of any convenient size, capable of holding the aerosol test chamber (Peet-Grady Chamber or larger chamber) and permitting adequate additional space for the operator to handle the test efficiently. While conducting tests, this room shall be maintained at a temperature of 75 to 85 degrees F. It is suggested that the relative humidity be held between 40 and 70 per cent. Since the exhaust fan of the chamber will move relatively large quantities of air, the temperature of the air entering this room should be approximately that specified above.

G. Aerosol Test Chamber: The test chamber shall be a Peet-Grady Chamber as specified in the Peet-Grady Method, or a larger chamber meeting the general specifications of the Peet-Grady Chamber. In the cases of larger chambers, it is recommended that the dimensions be such as to approximate a normal room.

H. Exhaust Fan: An exhaust fan moving not less than 1,000 cubic feet of air per minute through the Peet-Grady Chamber, or a fan of proportionately larger capacity for testing chambers larger than the Peet-Grady Chamber

*Chemical Specialties Manufacturers Association, 50 E. 42 St., New York, N. Y., formerly National Association of Insecticide and Disinfectant Manufacturers, Inc.

shall be used to ventilate the chamber after each test. It shall be arranged with adequate piping to exhaust the chamber vapors outside of the building.

I. Insecticide Paper: Unsized, nonglazed, absorbent paper, such as brown kraft or gray bogus, shall be used to cover the chamber floor. No special weight is specified although 60- to 80-lb. gray bogus paper has been found excellent. In certain laboratories, testing chamber ceilings and walls have been covered with cardboard, kraft paper or other material suitably arranged for easy renewal to reduce chamber cleaning difficulties.

J. Apparatus for Picking Up Flies: Any convenient means of picking up the paralyzed flies without injuring or appreciably disturbing them may be used. If a vacuum device is used, it must produce gentle suction, have a sufficiently large receptacle to prevent crowding of the flies, and shall be cleaned after each test with the same materials used in cleaning the chamber.

III. PROCEDURE

A. Rearing and Handling Flies: In this procedure, eggs are transferred to medium suitable for the development of larvae. The pupae are collected from the medium and placed inside of cages, and the adult flies emerge and remain in these cages until the day of testing. A culture is defined as all adults resulting from the seeding of eggs collected at one time on a given date.

(a) Larval medium: The preferred containers are cylindrical glass battery jars approximately 6 inches in diameter and 9 inches high. For one jar, mix 340 gm. (12 oz.) dry CSMA Standard Fly Larval Media[1] with approximately 750 cc. of an aqueous suspension containing 15 gm. moist cake yeast[2] or 5 gm. dry yeast[2] and 10 cc. non-diastatic Diamalt[2]. Mix thoroughly until a loose, fluffy medium is obtained, transfer it to the battery jar without packing, cover with cloth and set in the insectary. The amount of suspension required for best rearing results will need to be determined in each laboratory and it may be varied in order to prevent mold growth. It is suggested the medium be prepared in the late afternoon of the day before egg collection.

(b) Eggs: Eggs are collected for a period not longer than 16 hours from food dishes or other oviposition media in cages containing mature flies not more than 8 days old. It is suggested that fresh oviposition medium be placed in fly cages in the late afternoon and eggs be collected early on the following morning. After collecting the eggs, they must be measured and seeded without delay. Wash all the eggs together in tap water at room temperature and measure 2000 eggs as accurately as possible. This may be done by allowing the eggs to settle in a calibrated pipette or graduate (0.1 cc. settled eggs contain about 700) or the eggs can be filtered and measured in calibrated pits or cells. Use 10 cc. of tap water to measure and to scatter the eggs in a pit or trench 0.5 inches deep and located in the center of the surface of the larval medium. Cover the eggs with loose medium, replace the cloth covers on the jars, and set jars in the insectary so that at least 1.5 inches separate each jar to permit free air circulation. The maximum temperature in the jar (about 3 days later) must not exceed 130°F. Under normal conditions, more than 85 per cent of the eggs should hatch within 36 hours of the time they are laid.

(c) Pupae: Mature larvae migrate to the top portion of the medium and normally all larvae will have pupated by the seventh day after seeding eggs. When this occurs, the portion of medium containing pupae may be loosened, poured into a shallow tray, and air dried at room temperature. An electric fan may be used to hasten drying. Pupae may be separated from the dry medium by sprinkling the pupae-medium mixture on an inclined tray or chute set in front of an air blast such as that from an electric fan. The pupae must be handled gently and as little as possible in order to avoid injury. Any method that permits at least 95 per cent of flies to emerge is considered satisfactory.

An air separation apparatus (5) for separating pupae is used by several laboratories and found to be more rapid than the inclined tray method. The apparatus employs a blower, a cyclone collector, and a suction pipe. The device separates the heavier pupae from a layer of vermiculite placed on the surface of the fly medium before the larvae pupate. According to (6), a 2-inch layer of vermiculite should be placed on the larval medium three or four days after seeding. Six days after seeding, the mixture of vermiculite and pupae is loosened and poured on a tray and separated. Terra Lite Brand Vermiculite Soil Conditioner, available in 20-pound bags from some garden supply stores, has been found satisfactory for use in this procedure.

All of the pupae maturing on a given day are combined into one lot, mixed, and measured into test units. Each group is placed in a shallow dish which is, in turn, placed in a cage which provides at least 1 cu. inch of space per pupa. If the large group procedure is used, the test unit consists of approximately 500 pupae. If the small group procedure is used, more than 500 pupae are placed in stock cages and adult flies are sampled prior to testing. Under normal rearing conditions, at least 80 adult flies should be obtained for each 100 eggs seeded.

(d) Adult Fly Food: The food for adult flies shall consist of 5 per cent spray dried, nonfat milk solids and 2 per cent granulated sugar thoroughly dispersed in water. Roller dried or caked milk solids settle out of suspension within a few hours and are unsuitable as food. A 40 per cent formalin solution may be added to the food at the rate of 1/1500 to delay souring. Each cage is supplied daily with a dish containing at least 15 cc. food for each 100 flies, and so prepared as to prevent the flies from drowning. Satisfactory food must be available to the flies at all times. The adult flies are held until the second day of oviposition (usually 12 to 14 days after eggs are seeded) when they are ready for testing.

B. Testing Flies: Before a test is started, the test chamber must be clean and have clean paper on the floor, all ports and openings must be closed, and the temperature must be 82 ± 2°F., and all windows must be equally shaded. In chambers where walls and ceilings are covered with paper or other material, contamination, if present, must be at sufficiently low levels so as not to influence test results. Chambers are considered to be contaminated and unsatisfactory for test use when test flies, held in them for a 12- to 16-hour period with food but without insecticide treatment, show mortalities in excess of 10%, or when over 10% of the flies are paralyzed within 30 minutes after liberation. It is recommended that laboratories make a standard practice of taking contamination observations, employing a normal fly test group, following each day's testing. In both the large and small group procedures, only flies which are capable of flying shall be liberated into the aerosol test chamber. In the small group method, a sample of 100 ± 5 flies is used in each test; but in the large group method, all flies in one cage are used in a single test. Samples may be taken by liberating the flies directly into the chamber and continuing until about 10 per cent of flies remain in the stock cage. These are discarded. Samples may be taken also by discarding the first 10 flies and then counting 50 flies into each of a series of small cages. One hundred flies are counted into the last cage and, working backward, 50 flies are added to each. Flies remaining in the stock cage are discarded. The order of spray treatments must be randomized.

After liberating the flies in the chamber, and with the container at 82 ± 2°F., a total of 3.0 ± 0.5 grams of aerosol mixture per 1000 cubic feet for a Grade A aerosol or pressurized spray evaluation shall be applied in a continuous flow. For a grade B pressurized spray evaluation, a total of 6.0 ± 0.5 grams of mixture per 1000 cubic feet shall be applied in a continuous flow. In Peet-Grady Chambers, this is 0.648 ± 0.108 grams for a Grade A spray and 1.296 ± 0.108 grams for Grade B. The dispenser nozzle may be oscillated slowly to effect uniform distribution of the mist within the test chamber.

The mist shall not be directed onto chamber wall and testing surfaces. The test dispenser shall be weighed before and after the liberation of the aerosol or pressurized space spray mixture and the actual weight of material introduced shall be recorded. The chamber is closed at a constant temperature in

1. Order from Ralston Purina Co., St. Louis, Mo.
2. Diamalt and yeasts are products of Standard Brands, Inc., and are usually available from local distributors.

the range of 82 ± 2°F. for 15 minutes from the time the mist is introduced.

Where a Peet-Grady Chamber is used, the nozzle or exit orifice of the valve should be directed so that the spray goes through a port, meeting specifications of the Peet-Grady Method. Several CSMA laboratories use adjustable fixtures to hold the dispenser and permit the spray to be distributed from the same place and angle for each test. Different adjustments may be necessary for the OTA and the various test dispensers, and the spray pattern from new dispensers should be determined prior to the test. One laboratory reports successful use of dispensers with the nozzle positioned 8 inches from the ceiling and 10 inches from the corner of the Peet-Grady Chamber.

Counts shall be made as to the number of flies "down" (paralyzed) at 5 and 10 minutes following insecticide application. These counts are especially important because with conventional formulations practically all flies "down" at 15 minutes fail to recover during the 24-hour observation period. At the end of 15 minutes the ports are opened and the chamber is ventilated by means of the exhaust fan while the flies are collected.

The "down" flies are picked up and transferred immediately to clean cages meeting the specifications of Section II, paragraph D. These flies may be counted when they are picked up or later, depending upon which time is more convenient. During the subsequent 24-hour recovery period, the cage is placed in the rearing room and supplied with an adequate quantity of 5-per cent sugar solution, arranged so that the top of the dish is not more than ¾ inch above the floor of the cage and the flies cannot drown in it. A gauze-wrapped ball of cotton saturated with 5-per cent sugar solution is also satisfactory.

The "up" (unparalyzed) flies in the chamber at the end of the 15-minute exposure period are counted and discarded.

After a test is completed all toxic residues must be removed from the chamber or, if allowed to remain, must be at sufficiently low levels so as not to affect test results. Where chamber surfaces permit, many toxic residues can be removed by wiping with a clean cloth saturated with ethyl alcohol or ethyl alcohol containing 10 per cent acetone.

C. Assembling the Data: The number of "up" flies must be counted and recorded at the end of the 15-minute exposure period. The dead flies are counted 24 ± 1 hours later, preferably by removing them from the recovery cage. Only flies that show no sign of life upon being touched may be counted dead. If the "down" flies were counted as they were collected, the sum of the "down" and the "up" flies yields the total flies in the test. If the "down" flies were not counted as collected, the recovered flies are killed by placing the cage in an oven at 170°F. for a few minutes, after which they are counted. The sum of recovered and dead flies yields the "down" flies and this sum added to the "up" flies yields the total flies used in the test. The AEROSOL TEST KNOCKDOWN MORTALITY is the per cent dead of total flies. In the AEROSOL TEST KNOCKDOWN MORTALITY calculation, the "up" flies at the end of the 15-minute exposure period are considered to be alive at the end of the 24-hour observation period. The AEROSOL TEST KNOCKDOWNS are the per cent "down" of total flies at 5, 10, and 15 minutes.

The mortality and knockdown definitions are summarized in equation form as follows:

(1) Aerosol Test Knockdown

$$\text{Mortality} = \frac{\text{Dead "Down" Flies X 100}}{\text{Total Flies}}$$

(2) Test Knockdown, 5, 10 or 15 minutes

$$= \frac{\text{"Down" Flies X 100}}{\text{Total Flies}}$$

IV. CONDITIONS FOR OFFICIAL EVALUATION

1. The tests shall be conducted in accordance with the procedure previously described.

2. At least two cultures of flies, meeting Peet-Grady specifications shall be used in making an official evaluation.

3. Cages showing a combined mortality and crippling greater than 15 per cent on the day of test shall not be used.

4. In the small group procedure, using approximately 100 flies per test, no more than three unknown samples may be tested in conjunction with one OTA in any one series. Ten tests are run on the OTA and on each of the unknowns in parallel; that is, test each spray the same number of times on any one day. The samples of a series must be randomized in the order of testing.

5. The large group procedure, using approximately 500 flies per test, shall be conducted in the same manner as outlined for the small group procedure, with the exception that five, rather than ten, tests are required.

The dosage of the OTA and experimental aerosol shall be 3.0 ± 0.5 grams per 1000 cubic feet, while that of the experimental pressurized space spray may be either 3.0 ± 0.5 grams or 6.0 ± 0.5 grams per 1000 cubic feet, depending upon whether efforts are being made to qualify the experimental pressurized space spray as a Grade A (3.0 ± 0.5 grams) or Grade B (6.0 ± 0.5 grams) insecticide. The experimental aerosol or pressurized space spray tested at 3.0 ± 0.5 grams dosage shall be reported as "meeting the standard" if its knockdown at 5, 10 and 15 minutes and 24-hour AEROSOL TEST KNOCKDOWN MORTALITY is equal to, greater than, or not less than 5 percentage points below that of the OTA run in conjunction with the experimental insecticide. The experimental pressurized space spray tested at 6.0 ± 0.5 grams dosage shall be reported as "meeting the standard" if its knockdown at 15 minutes and 24-hour AEROSOL TEST KNOCKDOWN MORTALITY is equal to, greater than, or not less than 5 percentage points below that of the OTA run in conjunction with it (the OTA being tested at 3.0 ± 0.5 grams dosage).

7. The percentage knockdown and mortality of the insecticides, provided they "meet the standard," shall be designated by letter and shall be in accordance with the following grading system:

Grade	*Type of Insecticide*	*"Equal to" OTA at dosage of 3.0 ± 0.5 grams per 1000 cubic feet at dosage indicated below*
A	Aerosol or Pressurized Space Spray	3.0 ± 0.5 grams per 1000 cubic feet
B	Pressurized Space Spray	6.0 ± 0.5 grams per 1000 cubic feet

8. The OFFICIAL TEST AEROSOL (OTA) is restricted to use in the above described procedure and the CSMA Cockroach Aerosol Test Method (14). It shall be used only as the reference insecticide in testing aerosol and pressurized insecticides against the house fly and aerosol insecticides against cockroaches.

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(2) McGovran, E. R. and Fales, J. H., 1946. Toxicity of Aerosols. Rate Movement Through and Height of Suspension in a Toxic Aerosol Influences Mortality of Caged House Flies. Soap and Sanit. Chem. 22 (9): 127-129.

(3) Lindquist, A. W., Travis, B. V., Madden, A. H., Schroeder, H. O., and Jones, H. A., 1945. DDT and Pyrethrum Aerosols to Control Mosquitoes and Houseflies Under Semi-practical Conditions. Jour. Econ. Ent. 38: 255-257.

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(7) Goodhue, L. D., and Sullivan, W. N., 1943. Making and Testing Aerosols. In "Laboratory Procedures in Studies of The Chemical Control of Insects," Amer. Assoc. Adv. Sci. Publ. 20: 157-162.

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COCKROACH AEROSOL TEST METHOD

Tentative Official Method of the Chemical Specialties Manufacturers Association* for Evaluating Aerosols Against Cockroaches, 1961 Revision—Insecticide Division, Scientific Committee

I. INTRODUCTION

STARTING in 1942 extensive studies were made by various CSMA and Federal laboratories to develop a standard test method for evaluating aerosol insecticides against flying insects. This work lead to the adoption of the CSMA Aerosol Test Method for Flying Insects on October 12, 1952 (1), following the use of essentially the same method on a tentative basis starting in 1949 (2). During the same period a number of laboratories developed methods for evaluating aerosol insecticides against cockroaches. Descriptions of several of the methods appear in the literature (3,4,5), while other techniques were reported at meetings of the Insecticide Scientific Committee.

Early efforts of the Committee to develop a standard cockroach aerosol method centered around the use of space treatments in Peet-Grady or larger aerosol chambers with the insects exposed in suitable open cages. Following a cooperative test of a space spray method in 1952 and 1953, the Committee decided to use a direct spray treatment rather than a space treatment. It was also decided to use large nymphs of the German cockroach as the test insect and to try to adapt the procedure to the use of the same spray chamber specified for the Official Cockroach Spray Method (6). During 1954 a direct spray method was developed and studied by several CSMA and Federal laboratories. In a cooperative series of tests (early 1955), using coded dispensers with three different formulas (2.0% DDT plus 0.2%, 0.4% and 0.8% pyrethrins), all five laboratories were able to differentiate between the three formulas. A decision was then made by the Committee in May, 1955, to prepare the method in official form so that it might be considered for adoption on a tentative basis.

Reports of the Committee's studies appear in the minutes of the Insecticide Scientific Committee and the Committee reports in the CSMA PROCEEDINGS (7,8,9,10).

In this method it should be understood that the term "aerosol" applies to pressurized formulations containing 20 per cent by weight or less volatile ingredients (insecticides, base oils, solvents, etc.) and 80 per cent or more propellant liquefied gases (trichloromonofluoromethane, dichlorodifluoromethane, methylene chloride, etc.). Whether the method can be satisfactorily applied to formulations containing greater than 20 per cent low volatile ingredients will depend on additional study and cooperative tests.

The method here described is thought to offer a satisfactory means of determining the relative efficiency of aerosol formulations when applied as direct sprays to cockroaches. It is not designed to measure residual action. As a biological test it is subject to the variations that accompany the reaction of living organisms and should be employed under the supervision of a person familiar with the biological testing of insecticides. In order to measure with reasonable tolerance the relative effectiveness of different insecticides, the test is run in conjunction with the Official Test Aerosol, which is designated as the basis of comparison. The format of the method follows that of the Official Cockroach Spray Method.

II. APPARATUS

A. Reference Insecticide. The reference insecticide shall be the Official Test Aerosol (OTA) prepared by the CSMA, Inc. The OTA must be dispensed from the container in which it is supplied with particular care being taken that the OTA dispenser employed meets the specifications designated on its label.

B. Dispenser for Experimental Aerosol. No restriction is made on the dispenser employed in connection with the experimental aerosol formulation. However, it should be noted that the test results apply only to the experimental formulation as dispensed from the particular unit employed. In reporting results, the dispenser used with the experimental aerosol shall be specified.

C. Test Insect. The test insects shall be healthy, normal, undeformed last nymphal instars of the German cockroach, *Blattella germanica* (Linn.). Recently emerged last nymphal instars, e.g., those whose pigmentation is not dark, shall not be used for testing purposes. It is recommended that the last nymphal instar stage shall have been attained at least three days prior to testing.

D. Rearing Room. This room may be of any convenient size, constructed so as to be free from strong drafts and maintained at a temperature of 75 to 85°F. and a relative humidity of 30 to 50 per cent. It should be separate from the testing room in order to eliminate the possibility of traces of insecticide coming in contact with the test insects. Ventilation should be provided to reduce odor.

E. Testing Room. This room may be of any convenient size permitting adequate space for the operator to handle the test efficiently. While tests are being conducted this room shall be maintained at a temperature of 78 to 82°F. It is suggested that relative humidity be held between 30 and 50 per cent.

F. Spray Chamber. The spray chamber shall be a box-like structure of solid material measuring 18 inches wide, 18 inches long, and 25 to 30 inches high. The open floor of the chamber shall be covered with ½-inch mesh wire hardware cloth. Suitable guides shall be fastened to the chamber floor to permit the centering of the treatment container in some definite position in respect to the nozzle of the OTA and test aerosol dispensers. The top of the chamber shall be open. The front wall of the chamber may be in the form of a sliding door permitting convenient access to the interior of the chamber. The chamber shall rest on a stand, placing it at the proper height for convenient operation of the test.

An adjustable hinged shelf shall be affixed to the outside of the center of the back upper edge of the spray chamber. Any suitable shelf (see Figure 1) which will permit the OTA and test aerosol dispensers to be held in a standard position can be used. One satisfactory shelf is made of aluminum sheet fitted with adjustable guides (in slots with wing nuts) which permit adjustment for dispensers of different sizes. An adjustable metal support rod (casement window adjuster) can be used to regulate the angle of the shelf. Markings can be made on the rod and plate to permit rapid adjustment for different dispensers.

The above-described spray chamber is identical with that specified for the CSMA Official Cockroach Spray Method, except that the braces and mounting for the spray atomizer have been removed and the hinged shelf for holding the aerosol dispenser has been added.

G. Treatment Container. The treatment container shall be a screen-bottomed container 3½ inches in diameter with 3-inch side walls. Sixteen mesh wire screen shall be soldered in place to form the bottom of the container in such a manner that the entire bottom is completely open. Ordinary tin cups of the proper dimensions with handles removed and the solid bottom replaced by wire screening have been found useful as test containers.

H. Insecticide Paper. Unsized, nonglazed, absorbent paper such as brown

*Chemical Specialties Manufacturers Association, 110 E. 42 Street, New York, New York, formerly National Association of Insecticide and Disinfectant Manufacturers, Inc.

kraft or gray bogus paper shall be used beneath the treatment container during the application of the aerosol mist. No special weight is specified, although 60 to 80-pound gray bogus paper has been found excellent.

I. Recovery Dishes. Glass crystallizing dishes measuring 125 millimeters in diameter and 65 millimeters high shall be employed as recovery cages. The bottoms of the recovery dishes shall not be covered with filter paper or other materials. Sixteen mesh wire screen covers may be employed as recovery dish covers during the 48-hour holding period following spray application in order to prevent the entry of wild roaches.

EXAMPLE OF TEST DATA

		OTA		*Sample A*		*Sample B*	
Test	*Date*	*Dosage (grs.)*	*% D&M 48 hrs.*	*Dosage (grs.)*	*% D&M 48 hrs.*	*Dosage (grs.)*	*% D&M 48 hrs.*
1	2/15/55	3.1	90	3.3	75	3.2	35
2	2/15/55	3.2	80	3.8	80	3.1	40
3	2/15/55	3.2	35	2.0	65	2.9	20
4	2/22/55	3.3	50	3.2	75	3.2	35
5	2/22/55	2.7	55	3.3	75	3.1	50
6	2/22/55	3.0	80	2.9	60	2.8	35
7	2/22/55	3.0	60	3.1	65	3.3	35
8	2/22/55	2.9	50	3.0	80	2.9	25
9	2/22/55	2.9	60	3.1	75	2.9	35
10	2/22/55	3.3	35	3.0	70	3.6	50
Average		3.06	59.5	3.07	72.0	3.10	36.0

Reported as follows: Sample A—Meets Standard. Sample B—Does not meet Standard.

III. PROCEDURE

A. Rearing of Test Insects. Any suitable method permitting the production of large numbers of the test insect under controlled conditions of temperature and humidity as previously described may be employed. The rearing technique described by Woodbury and Barnhart (11), which makes good use of a brood chamber containing adult females from which large numbers of first instar nymphs may be collected at frequent intervals, has been successfully used in a number of laboratories. All molded food, dead females, and empty egg cases should be removed weekly. Wild cockroaches shall not be used, and all test insects shall have been reared under uniform conditions.

B. Food. Up until the time of testing, cockroaches shall be provided at all times with food and water. The standard food, shall be Purina Laboratory Chow, manufactured by the Ralston Purina Company, St. Louis, Missouri, or equivalent (12).

C. Test Procedure. Last instar nymphs shall be isolated in the recovery dishes or other suitable containers from the cultures in groups of 20 by means of a suction device, by anesthetizing them with carbon dioxide gas or any other suitable method which does not injure them. In selecting the test insects, every effort shall be made to obtain uniform test groups.

Prior to use, the OTA and test aerosol dispensers shall be calibrated at $82 \pm 2°$F. to determine their spray rate in grams per second. The dispensers shall be aligned on the adjustable shelf and settings determined for the various dispensers to permit rapid handling. The dispensers shall be so aligned that the aerosol mist is directed into the open top of the treatment container which rests on the floor of the spray chamber. The treatment container shall be placed against the center of the front wall of the spray chamber. Suitable guides on the chamber floor or front wall of the chamber will aid in placing the treatment container in a standard position. A line may be drawn on the chamber wall and on the dispenser to aid in aligning the nozzle with the center of the top of the treatment container. The treatment container shall rest on a 5 x 5 inch square of insecticide paper. Except for the 5 x 5 inch square of paper, the chamber floor (½ inch mesh wire hardware cloth) shall be open. The paper shall be changed after each spray application.

Immediately before spray application the cockroaches shall be transferred to the screen-bottomed treatment containers. These containers shall be free from all traces of insecticides and shall have the entire inner wall surface suitably oiled or greased to prevent the escape of the cockroaches and to confine them to the container floor. Prior to spray application the treatment container shall be agitated sufficiently to distribute the test insects uniformly over the container floor. The treatment container shall be removed from the spray chamber 30 seconds after the start of spray application. The test insects shall be immediately transferred from the treatment container to the recovery dish. The treated cockroaches shall be held under rearing room conditions through the 48-hour observation period and shall receive neither food nor water.

In evaluating a test sample, a minimum of 10 individual test groups shall be run for the test dispenser in conjunction with 10 test groups receiving the OTA. An equal number of replicates shall be made for members of any given test series on a given test day. The average dosage employed shall be approximately the same throughout a given series of tests and of such magnitude as to result in an average of 50 per cent to 75 per cent of the insects dead and moribund at 48 hours with the OTA. Average dosages shall be considered the same if they agree within 0.2 grams. Cooperative tests among CSMA laboratories have shown the required dosage to be 2.0 to 4.0 grams. Test dispensers shall be weighed before and after the spraying of each test group of insects, and the weight of material used shall be recorded.

D. Assembly and Evaluation of Data. Evaluation of test dispensers shall be made on the basis of observations taken 48 hours after spray application, at which time the percentage of test insects normal, moribund, and dead shall be determined. Any insect showing signs of life but incapable of locomotion shall be considered moribund. Similar records taken at 24 hours or at intervals longer than 48 hours may be of interest in critical studies. It is recommended

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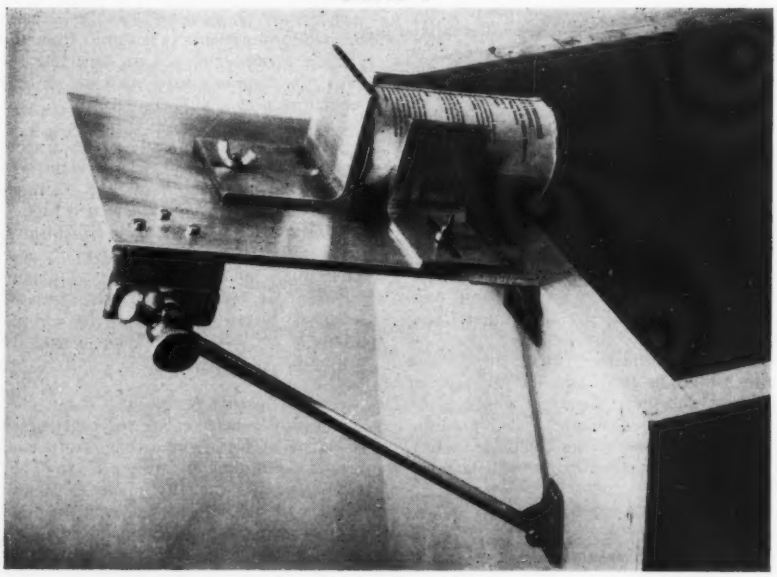
FIGURE 1



COCKROACH SPRAY METHOD

Official Method of the Chemical Specialties Manufacturers Association* for Evaluating Liquid Household Insecticides Against Crawling Insect Pests, 1961 Revision—Insecticide Division, Scientific Committee

THE National Association of Insecticide & Disinfectant Manufacturers sponsored a fellowship at the Ohio State University from 1937 to 1942 for the study of testing methods suitable for evaluating liquid household insecticides against crawling insects. This project was directed by Prof. F. L. Campbell and employed as investigators at various times were E. N. Woodbury, C. S. Barnhart, E. H. Glass, and J. M. Hutsel. Results of these studies have been summarized in various published articles[1,2,3], and much valuable information was obtained on both rearing and test methods. In spite of the fact that a number of test methods were devised and employed on both bedbugs and cockroaches, none of the methods received widespread official recognition. In 1943 Henderson reported on a liquid cockroach spray testing method being employed by the Production and Marketing Administration of the U.S. Department of Agriculture. From 1943 to 1946 crawling insect test method studies were conducted with CSMA (then NAIDM) support by F. O. Hazard, Wilmington College, Wilmington, Ohio, with special emphasis on the study of the Henderson method. Both liquid and powder methods for cockroach testing have been published by Hazard[5,6]. L. J. Bottimer[7] published on the current method used by the Insecticide Division Livestock Branch, Production and Market Administration, United States Department of Agriculture, for the testing of liquid cockroach sprays.

The method here described is a composite of the Bottimer and Hazard method with certain modifications developed through cooperative tests between various laboratories of the CSMA (then NAIDM), and is thought to offer a satisfactory means of determining the relative efficiency of contact insecticides in oils as cockroach sprays. As a biological test it is subject to variations that accompany the reaction of living organisms and should be employed under the supervision of a person familiar with the biological testing of insecticides. In order to measure with reasonable tolerance the relative effectiveness of different insecticides, the test is run in conjunction with the Official Test Insecticide, which is designated as the basis of comparison.

II. APPARATUS

A—Reference Insecticide: The reference insecticide shall be the current Official Test Insecticide (OTI) prepared and sold by the CSMA, 50 E. 41st Street, New York 17, New York. The OTI is carefully standardized by both biological and chemical analysis and it must not be diluted or changed in any manner. References to the OTI (other than in this presentation) should identify the OTI by date. The current OTI, 1959-62, is certified for use through December 31, 1962.

B—Test Insect. The test insects shall be healthy, normal undeformed adult males of the German cockroach *Blattella germanica* (Linn.). Recently emerged adult males, e.g., those whose pigmentation is not dark, shall not be used for testing purposes. It is recommended that the adult stage shall have been attained at least three days prior to testing.

C—Rearing Room. This room may be of any convenient size, constructed so as to be free from strong drafts and maintained at a temperature of 75 to 85°F. and a relative humidity of 30 to 50 per cent. It should be separate from the testing room in order to eliminate the possibility of traces of insecticide coming in contact with the test insects. Ventilation should be provided to reduce odor.

D—Testing Room. This room may be of any convenient size permitting adequate space for the operator to handle the test efficiently. While tests are being conducted this room shall be maintained at a temperature of 78 to 82°F. It is suggested that relative humidity be held between 30 and 50 per cent.

E—Spray Chamber. The spray chamber shall be a box-like structure of solid material measuring 18 inches wide, 18 inches long and 25 to 30 inches in height. The floor of the chamber shall be covered with ½ inch mesh wire hardware cloth. Suitable guides shall be fastened to the chamber floor to permit the centering of the treatment container directly beneath the nozzle of the spray gun. The top of the chamber shall be open and fitted with suitable braces and mounting for the spray atomizer. The front wall of the chamber may be in the form of a sliding door permitting convenient access to the interior of the chamber. The chamber shall rest on a stand placing it at the proper height for convenient operation of the test.

F—Atomizer. The atomizer to be employed is the DeVilbiss Special No. 5004, which is the same atomizer specified for the Peet-Grady Test. This atomizer shall be operated with air free of oil, dust particles, or condensed moisture, and maintained at a constant pressure of 6.0 plus or minus 0.5 lbs. per sq. in. The atomizer when operated at a pressure of 12.5 plus or minus 0.5 lbs. per sq. in. shall deliver 12 ccs. of OTI in 24 seconds (tolerance plus or minus 1 second) and this should be checked frequently. The atomizer shall be firmly mounted in a manner to permit adjustment and shall be arranged with the barrel in a vertical position and centered with the nozzle tip 28 inches above the bottom of the treatment container which rests on the chamber floor. The intake tube of the atomizer shall be bent at a right angle, adjusted with the open end pointing toward the floor and of sufficient length to permit the spray vials to be held in place without interfering with the spray cone.

G—Treatment Container. The treatment container shall be a screen bottomed container 3½ inches in diameter with 3 inch side walls. Sixteen mesh wire screen shall be soldered in place to form the bottom of the container in such a manner that the entire bottom is completely open. Ordinary tin cups of the proper dimensions with handles removed and the solid bottoms replaced by wire screening have been found useful as test containers.

H—Recovery Dishes. Glass crystallizing dishes measuring 125 millimeters in diameter and 65 millimeters high shall be employed as recovery cages. The bottoms of the recovery dishes shall not be covered with filter paper or other material. Sixteen mesh wire screen covers may be employed as recovery dish covers during the 48-hour holding period following spray application in order to prevent the entry of wild cockroaches.

III. PROCEDURE

A—Rearing of Test Insects. Any suitable method permitting the production of large numbers of the test insect under controlled conditions of temperature and humidity as previously described may be employed. The rearing technique described by Woodbury and Barnhart[2], which makes use of a brood chamber containing adult females from which large numbers of first instar nymphs may be collected at frequent intervals, has been successfully used in a number of laboratories. All molded food, dead females and empty egg cases should be removed weekly. Wild cockroaches shall not be used and all test insects shall have been reared under uniform conditions.

B—Food. Until the time of testing, the cockroaches shall be provided at all times with food and water. The

*Chemical Specialties Manufacturers Association, 110 E. 42 St., New York, N.Y., formerly National Association of Insecticide and Disinfectant Manufacturers, Inc.

standard food shall be Purina Laboratory Chow, manufactured by the Ralston Purina Co., St. Louis, Missouri, or equivalent (8).

C—Test Procedure. Adult male roaches shall be isolated in recovery dishes or other suitable containers from the cultures in groups of 20 by means of a suction device, by anesthetizing them with carbon dioxide gas or any other suitable method which does not injure them. In selecting the test insects every effort shall be made to obtain uniform test groups.

Air shall pass continuously through the atomizer at the prescribed pressure during the entire series of tests. Prior to application of test samples, the gun shall be thoroughly cleaned with a suitable solvent such as acetone and shall be primed with the spray solution to be applied. Spraying of individual test groups shall be effected by bringing an accurately measured amount of the test spray contained in a vial in contact with the atomizer intake tube.

Immediately before spray application the roaches shall be transferred to screen-bottomed treatment containers. These containers shall be free from all traces of insecticides and shall have the entire inner wall surface suitably oiled or greased to prevent the escape of the insects and to confine them to the container floor. The treatment container shall be centered on the spray chamber floor directly below the atomizer nozzle and the spray applied as described above. Prior to spray application the treatment container shall be agitated sufficiently to distribute the test insects uniformly over the container floor. The treatment container shall be removed from the spray chamber 30 seconds after the start of spray application. The test insects shall be immediately transferred from the treatment container to the recovery dish. Treated roaches shall be held under rearing room conditions throughout the 48-hour observation period and shall receive neither food nor water.

In evaluating a test sample a minimum of 10 individual test groups shall be run for the test spray in conjunction with 10 test groups receiving the OTI. An equal number of replicates shall be made for members of any given test series on a given test day. The dosage employed shall be the same throughout a given series of tests and of such magnitude as to result in an average of 70 per cent to 90 per cent of the insects dead and moribund at 48 hours with the OTI. Cooperative tests among CSMA laboratories have shown the required dosage to be 0.5 to 0.9 ml.

D—Assembly and Evaluation of Data. Evaluation of test samples shall be made on the basis of observations taken 48 hours after spray application, at which time the percentage of test insects normal, moribund, and dead shall be determined. Any insect showing signs of life but incapable of locomotion shall be considered as moribund. Similar records taken at 24 hours or at intervals longer than 48 hours may be of interest in critical studies. It is recommended that if the test insects are to be held under observation longer than 48 hours they be furnished food and water at the end of the initial 48 hour observation period. Insects that withstand insecticide treatments shall be destroyed and in no case returned to the stock cultures or employed in further tests. In cases of semi-concentrate sprays or sprays of especially high toxicity to cockroaches they shall be tested by the above method as recommended by the manufacturer. For example, if a manufacturer claims his product to be three times as effective as the standard (OTI), the spray shall be diluted at the rate of one part of the spray with two parts deodorized insecticide base oil by volume prior to testing. The basis of comparison shall be the average percentage dead and moribund of the test sample as compared with that of the OTI. In reporting the test results the test sample shall be reported as "meeting the standard" if its average percentage dead and moribund determination at 48 hours is equal to, greater than, or within 5 percentage points less than that of the OTI employed in conjunction with it. In no case shall actual numerical values be reported officially or any letter grade designations be assigned to the test samples as a measurement of their effectiveness against roaches. The accompanying table records the results of a typical series.

IV. CONDITIONS FOR OFFICIAL EVALUATION

A—The test shall be conducted in accordance with the procedure previously described.

B—Twenty test groups of insects, numbering 20 roaches each (10 test sample, 10 OTI) shall be employed in making official evaluation.

C—The dosage shall be constant throughout a given series of tests and of such magnitude as to give an average of from 70 to 90 per cent of the OTI treated roaches dead and moribund 48 hours after spray application.

D—The toxicity of the unknown sample shall be reported as meeting the standard if its average percentage dead and moribund determination at 48 hours is equal to, greater than, or within 5 percentage points less than that of the OTI run in conjunction with it. In cases of semi-concentrate sprays or sprays of especially high toxicity to roaches, they shall be tested as recommended by the manufacturer. In no case shall numerical values be reported or any letter grade designations be assigned to the test samples as a measurement of their toxicity to roaches.

References

(1) Woodbury, E. N., 1938—Test Methods on Roaches—Soap and Sanitary Chemicals, Vol. 14, No. 8, pp. 86, 87, 88, 89, 90, 107, 109.

(2) Woodbury, E. N., and Barnhart, C. S., 1939—Tests on Crawling Insects—Soap and Sanitary Chemicals, Vol. 15, No. 9, pp. 93, 95, 97, 99, 101, 103, 105, 107, 113.

(3) Campbell, F. L.; Barnhart, C. S. and Hutzel, J. M., 1941 Tests on Crawling Insects — Soap and Sanitary Chemicals, Vol. 17, No. 7, pp. 105, 106, 107, 109, 111, 113, 115; Vol. 17, No. 8, pp. 105, 107, 109, 111, 113, 115, 121.

(4) Henderson, L. S., 1943 — A Roach Testing Method — Unpublished report, U.S.D.A., Insecticide Testing Laboratory, Beltsville, Md.

(5) Hazard, F. O., 1943 — Liquid and Powdered Methods for Roach Testing—Soap and Sanitary Chemicals, Vol. 21, No. 6, pp. 126, 127.

(6) Hazard, F. O., 1945—Modifications of the Liquid Roach Method—Soap and Sanitary Chemicals, Vol. 21, No. 12, pp. 159, 167.

(7) Bottimer, L. J., 1945 — Roach rearing and Testing — Soap and Sanitary Chemicals, Vol. 21, No. 12, pp. 151, 153, 155, 157, 159.

(8) Anon. 1959. Revised Official Cockroach Spray Method. III Procedure B Food. CSMA Proceedings, May, 1959. P. 146.

(Adopted by CSMA Board of Governors, May, 1953.)

EXAMPLE OF TEST DATA

0.7 ml. Dosage by CSMA Roach Test Method

Per Cent Dead and Moribund 48 Hours

Test	*Date*	*OTI*	*Spray A*	*Spray B*	*Spray C*
1	5/13/46	90	85	100	100
2	5/13/46	85	75	45	90
3	5/13/46	30	50	55	100
4	5/13/46	65	70	40	100
5	5/13/46	100	85	65	100
6	5/13/46	75	75	85	95
7	5/16/46	80	85	35	100
8	5/16/46	65	70	65	100
9	5/16/46	95	90	30	95
10	5/16/46	80	45	60	100
Average		76.5	73.0	58.0	98.0

Reported as follows: Spray A—Meets Standard; Spray B—Does not meet Standard; Spray C—Meets Standard.

CSMA CHEMICAL ANALYSIS TEST METHODS

Test Methods of the Insecticide Chemical Analysis Committee of the Chemical Specialties Manufacturers Association* — 1961 revisions.

CSMA 61-1
Method of Analysis of Refined and Commercial Allethrin
(Official)

Scope

1. This method describes a procedure for the analysis of samples of refined and commercial allethrin. The procedure includes determination of allethrin, chrysanthemum monocarboxylic acid, chrysanthemum monocarboxylic acid anhydride and chrysanthemum monocarboxylic acid chloride. If other components are present, which react with ethylenediamine to produce acids, they will interfere in the determination of allethrin unless proper corrections are made for their presence.

Definition

2. After correction for the chrysanthemum monocarboxylic acid, chrysanthemum monocarboxylic acid anhydride, and chrysanthemum monocarboxylic acid chloride, allethrin is determined as percent of the normal ester.

Outline of the Method

3. Allethrin reacts quantitatively with ethylenediamine to form chrysanthemum monocarboxylic acid which is determined by titration with standard sodium methylate in a pyridine medium. Chrysanthemum monocarboxylic acid, the anhydride, and the acid chloride interfere quantitatively and are determined independently.

Chrysanthemum monocarboxylic acid and the acid chloride are determined by titration with sodium hydroxide in an ethanolic medium using alpha-naphtholbenzein indicator. The reaction in each case is equimolar.

The acid chloride is determined independently by reacting the sample with methanol and titrating the hydrogen chloride formed with methanolic potassium hydroxide to a dimethyl yellow-methylene blue endpoint.

Chrysanthemum monocarboxylic acid chloride and the anhydride are determined together by reaction with a measured excess of morpholine in a methanolic medium followed by titration of the excess morpholine with standard methanolic hydrochloric acid using dimethyl yellow-methylene blue indicator. In this determination the acid chloride consumes morpholine mole for mole and also produces a mole of titratable acid so that its equivalent weight is one-half the molecular weight. Chrysanthemum monocarboxylic acid anhydride consumes morpholine mole for mole and produces a mole of chrysanthemum monocarboxylic acid which is neutral under the conditions specified.

From these four determinations the allethrin, chrysanthemum monocarboxylic acid, the acid, the acid chloride and the anhydride are calculated.

Reagents

4. (a) Ethanol, anhydrous, or ethanol, anhydrous, S.D.2-B.
   (b) Phenolphthalein indicator, 1.0 per cent alcoholic solution.
   (c) Standard 0.02 N sodium hydroxide.
   (d) Methanol, anhydrous.
   (e) Standard 0.1 N sodium hydroxide.
   (f) Hydrochloric acid, 0.1 N methanolic solution. Transfer 17 ml. of 6 N hydrochloric acid to a 1000-ml. volumetric flask and dilute to the mark with methanol. Standardize by titrating exactly 40 ml. of the acid with the standard 0.1 N sodium hydroxide using phenolphthalein as the indicator. For the change of normality with temperature use $\Delta N/°C = -0.0001$.
   (g) Morpholine solution. Transfer 8.7 ml. of redistilled morpholine to a one-liter reagent bottle and dilute to one liter with methanol. Fit the bottle with a two-hole rubber stopper and through one hole insert a 20-ml. pipet so that the tip extends below the surface of the liquid; through the other hole insert a short piece of glass tubing to which is attached an aspirator bulb.
   (h) Dimethyl yellow-methylene blue mixed indicator. Dissolve 1.0 gm. of dimethyl yellow (p-dimethylaminoazobenzene) and 0.1 gm. of methylene blue in 125 ml. of methanol.
   (i) Pyridine, redistilled.
   (j) Thymolphthalein indicator, 1.0 per cent pyridine solution.
   (k) Ethylenediamine, redistilled; water content, 3 per cent, maximum.
   (l) Sodium methylate, 0.1 N pyridine solution. Transfer 25 ml. of 4 N sodium methylate to a one-liter reagent bottle containing 75 ml. of methanol and dilute to one liter with redistilled pyridine. Standardize this solution each day it is used against Bureau of Standards benzoic acid using about 50 ml. of pyridine as a solvent and thymolphthalein as the indicator. For the change of normality with temperature use $\Delta N/°C = -0.0001$. The reagent readily absorbs carbon dioxide from the air, and is best preserved and used in a 50-ml. automatic buret. All vents open to the air must have protective Ascarite tubes.
   (m) Alpha-naphtholbenzein indicator, 1.0 per cent alcoholic solution.
   (n) Standardize 0.02 N methanolic potassium hydroxide.

Procedure

5. *Chrysanthemum Monocarboxylic Acid Chloride*
   (a) Add 8 to 10 drops of the dimethyl yellow-methylene blue indicator to approximately 150 ml. of methanol in a 250-ml. glass stoppered Erlenmeyer flask, and add 0.1 N methanolic hydrochloric acid dropwise, until the solution appears reddish brown by transmitted light.
   (b) Add 0.02 N methanolic potassium hydroxide dropwise until the appearance of the first green color.
   (c) Transfer 25 ml. of this solution to each of three 125-ml. glass-stoppered Erlenmeyer flasks.
   (d) Reserve one of the flasks as a reference color for the endpoint determination.
   (e) Into each of the other flasks introduce 1.5 to 2.5 gm. of sample weighed to the nearest 0.1 mg. using a suitable weighing pipet. Swirl the flask during the addition of the sample.
   (f) Within 5 minutes titrate each of the samples with 0.02 N methanolic potassium hydroxide to the first green endpoint, using the blank as a reference color.
   (g) Milliequivalent calculation

$$\frac{A \times N}{\text{gm. sample}} = C$$

   A = ml. of N normal KOH required for sample titration
   C = chrysanthemum monocarboxylic acid chloride, meqv per gm.
   (h) Percentage calculation
   C × 18.67 = chrysanthemum monocarboxylic acid chloride, % by weight

*The Chemical Specialties Manufacturers Association, 50 E. 41 St., New York 17, N. Y.

6. *Chrysanthemum Monocarboxylic Acid*

(a) Transfer 25 ml. of the anhydrous ethanol to each of two 125-ml. glass-stoppered Erlenmeyer flasks.

(b) Add 8 or 9 drops of alpha-naphthol benzein indicator to each flask and cool the flask and contents to 0°C. in a suitable ice bath.

(c) Neutralize by the dropwise addition of 0.02 N sodium hydroxide to a bright green end-point.

(d) Into each flask introduce 1.5 to 2.5 gm. of sample weighed to the nearest 0.1 mg. using a suitable weighing pipet.

(e) Immediately titrate with standard 0.02 N sodium hydroxide to the first bright green end-point.

(f) Milliequivalent calculation

$$\frac{A \times N}{\text{gm. sample}} = D$$

A = ml. of N normal NaOH required (paragraph 6e)
D = acid and acid chloride, meqv per gram.

(g) Percentage calculation
(D–C) × 16.82 = chrysanthemum monocarboxylic acid, % by weight
C = chrysanthemum monocarboxylic acid chloride, meqv per gm. (paragraph 5g)

7. *Chrysanthemum Monocarboxylic Anhydride*

(a) Carefully pipet 20 ml. of the morpholine solution into each of four 250-ml. Erlenmeyer flasks, using the same pipet for each transfer. Fill the pipet by exerting pressure in the reagent bottle with the aspirator bulb.

(b) Reserve two of the flasks for blanks.

(c) Into each of the other flasks introduce 1.5 to 2.5 gm. of sample weighed to the nearest 0.1 mg. using a suitable weighing pipet.

(d) Swirl the flasks and allow the samples to stand together with the blanks at room temperature for 5 minutes.

(e) Add 4 or 5 drops of the dimethyl yellow-methylene blue indicator to each of the flasks and titrate with standard 0.1 N alcoholic hydrochloric acid until the color changes from green to a faint red when viewed by transmitted light.

(f) Milliequivalent calculation

$$\frac{(B–A) \times N}{\text{gm. sample}} = E$$

A = ml. of N normal HCl required for the sample
B = average ml. of N normal HCl required for the blank
E = apparent chrysanthemum monocarboxylic anhydride, meqv per gm.

(g) Percentage calculation
(E—2C) × 31.84 = chrysanthemum monocarboxylic anhydride, % by weight
C = chrysanthemum monocarboxylic acid chloride, meqv per gm. (paragraph 5g)

8. *Allethrin*

(a) Introduce an amount of sample calculated to contain 0.8 to 1.1 gm. of allethrin into each of two 250-ml. Erlenmeyer flasks. Weigh the sample to the nearest 0.1 mg. using a suitable weighing pipet.

(b) Reserve two additional flasks as blanks.

(c) To each of the blanks and samples introduce 25 ml. of the re-distilled ethylenediamine using a suitable dispensing burette protected from the atmosphere by Ascarite tubes. Swirl the samples to effect solution.

(d) Allow the samples to stand together with the blanks at 25 ± 2°C. for 2 hours. *Note:* The reaction may also be conducted in *heat-resistant* pressure bottles at 98 ± 2°C. for 30 minutes.

(e) Wash down the sides of each flask wtih a 50-ml. portion of re-distilled pyridine.

(f) To each flask add 6 to 10 drops of the thymolphthalein indicator and titrate with standard 0.1 N sodium methylate in pyridine to the first permanent blue-green end-point. With colorless samples, the first blue end-point may be used.

(g) Milliequivalent calculation

$$\frac{(A–B) \times N}{\text{gm. sample}} = F$$

A = ml. of N normal sodium methylate required for the sample
B = average ml. of N normal sodium methylate required for the blank
F = apparent allethrin, meqv per gm.

(h) Percentage calculation
(F + 2C—D—E) × 30.24 = allethrin, % by weight
C = chrysanthemum monocarboxylic acid chloride, meqv per gm. (paragraph 5g)
D = acid and acid chloride, meqv per gm. (paragraph 6f)
E = apparent chrysanthemum monocarboxylic anhydride, meqv per gm. (paragraph 7f)

9. *References*

The following references are taken from the foregoing method and list slight revisions.

a) Interim Federal Specification—Insecticide, Allethrin, Aerosol, Insecticide Pyrethrum, O-I-00507(AGR-ARS).

(b) Official Method of Analysis, Association of Agricultural Chemists, Ninth Edition, page 50.

CSMA 61-2
Analysis of Aerosol Insecticides
(Tentative)

Scope

1. This method describes the analysis of non-volatile ingredients from low pressure type aerosols containing a mixture of propellants Freon 11 (fluorotrichloromethane) and Freon 12 (difluorodichloromethane).

Procedure

2. Weigh the dispenser and contents, cool in a dry ice chamber or other satisfactory cooler such as a refrigerator freezing compartment for approximately one half hour; punch a very small hole in the top of the container, and allow it to stand in a hood at room temperature while the propellant gas (Freon 12) escapes. After the Freon 12 has volatalized, carefully cut off the top of the container and gently warm near the steam bath to boil off the Freon 11. Finally, warm on the steam bath until all the Freon 11 is expelled. Cool to room temperature, and weigh the container with the non-voatile material. Transfer the non-volatile material to a suitable container and retain for analysis. Rinse the aerosol container with ether, dry, and weigh. The difference between these weights represents the weight of non-volatile material in the aerosol. Weigh the top of the container which had previously been removed, add this weight to that of the empty and dried container, and subtract their combined weight from the original gross weight of the aerosol to obtain the net content. Calculate and report the percentage of non-volatile residue obtained from the aerosol.

ANALYSIS OF THE COMPONENTS IN THE NON-VOLATILE MATERIAL

Pyrethrins

3. Pyrethrins I and II may be determined in the presence of naphthalene oils, sesame, and piperonyl butoxide. However, in the presence of sesame oil, additional barium chloride is required to precipitate the soaps formed from the saponification of the sesame and consequently the amount of sulfuric acid (1-4) should be increased. Cyclohexane seriously interferes with the determination of Pyrethrin II, so it is only necessary to determine Pyrethrin I, and multiply its value by 2 to obtain the approximate percentages of total pyrethrins. A 3-5 sample of the non-volatile residue is usually sufficient for the determination of the pyrethrins.

DDT or Methoxychlor

4. The total chlorine in either of these ingredients may be determined by

an approximate A.O.A.C. DDT procedure. However, a small quantity of Freon 11 may remain with the non-volatile material and must be removed prior to analysis. A satisfactory procedure is as follows: Transfer a sample containing approximately 0.033 to 0.035 gms. of chlorine to a 250 ml Erlenmeyer flask, add 10 ml of acetone and evaporate on a steam bath. Add 10 ml more of acetone and again evaporate. This treatment will remove all the Freon 11 which boils at 25°C and should not remove any DDT or methoxychlor.

MIXTURES OF DDT AND METHOXYCHLOR

5. Mixtures of DDT and methoxychlor appear in some aerosols and may be determined by the partition chromatographic method (1) with the following technique. Weigh about 10 ml of the non-volatile matter into a 50 ml volumetric flask. Add 1 ml of mixed dye and dilute to volume with mobile solvent. Collect and combine the DDT fractions in the usual manner employing the "long" column (100 g silicic acid, etc.) These fractions will contain, in addition to the DDT, mineral oil and probably other contaminants. Determine the total chlorine in these fractions and calculate its percentage to DDT.

After the last trace of violet dye is off the column, collect and discard about 80 ml of effluent mobil solvent. Then begin to take and evaporate 10 ml fractions. After the 2,2-bis(p-methoxy phenyl) — 1,1,1-trichloroethane appears, continue to collect 10 ml fractions until all the p-methoxychlor has passed through the column (Usually 8-10 fractions are sufficient). Combine the fractions containing the p-methoxychlor, remove the solvent and weigh. Calculate the percentage of total methoxychlor on the basis that the technical product contains a minimum of 88% of the p-isomer.

DETECTION OF METHYLATED AROMATIC PETROLEUM DERIVATIVE OILS (METHYL NAPHTHALENE OILS)

6. Methylated aromatic petroleum derivative solvent oils frequently occur in aerosols. Add several drops of the non-volatile residue to 15 ml of a saturated solution of picric acid in a 125 ml Erlenmeyer flask and shake vigorously. A formation of an orange yellow to reddish orange precipitate of a picrate-naphthalene derivative is indicative of their presence.

DETECTION OF SESAME OIL (2)

7. Add 2 ml of furfural to 100 ml of alcohol. Mix thoroughly 0.1 ml of this solution with 10 ml of HCl and 5-10 ml of the sample by shaking them together in a test tube for 15 seconds. Allow mixture to stand for 10 minutes, observe color, add 10 ml of H_2O, shake, and again observe color. If the crimson color disappears, sesame oil is not present. (As furfural gives a violet tint with HCl, it is necessary to use the very dilute solution specified.)

DETECTION OF PIPERONYL BUTOXIDE (3)

Reagent

8. Dissolve 0.05 g of tannic acid in 15 ml of glacial acetic acid by shaking at room temperature. When the tannic acid is all in solution, add 35 ml of 85% phosphoric acid and thoroughly mix the solution. This reagent should be freshly prepared for each day's determinations and should be kept tightly stoppered since it is hygroscopic.

Test—Dilute a sample of the non-volatile residue with odorless base oil so that it will contain approximately 50 mg of piperonyl butoxide per 100 ml of solution. Transfer 0.1 ml of the diluted solution to an 18 x 150 ml test tube and add 5 ml of the reagent. Shake the tube vigorously for 30 seconds and then put in a bath of boiling water for 5 minutes. A blue color will develop in the presence of piperonyl butoxide.

(1) T. H. Harris, Journ. of A.O.A.C., Vol. 32, No. 3, Aug. 1949.
(2) Methods of Analysis of the A.O.A.C., 6th Ed. 1945, par. 31.51, page 509.
(3) Abstracted from a method submitted 11-7-49 by U. S. Industrial Chemicals, Inc.

CSMA 61-3
Analysis of Technical Aldrin
(Tentative)

Scope

1. Describes the method of analysis of Technical Aldrin for total chlorine and estimation of the percentages of hexachloro hexahydro dimethane naphthalene and related compounds in formulations containing 85.5% HHDN.

Method

2. CSMA 61-3 is identical with the Method of Analysis of Technical Aldrin adopted as First Action by the Association of Agricultural Chemists, October, 1960.

CSMA 61-4
Determination of Benzyl Benzoate
(Tentative)

Scope

1. This method defines the quality of benzyl benzoate when used in insect repellent formations for treating clothing.

Properties

2. The material shall conform to the following requirements:

Appearance	Clear liquid, colorless to light straw, 2 Gardner color standard 1933, maximum
Odor	Somewhat pleasant odor, which is characteristic
Total chlorine	1.100-1.120
Ester content	1.560-1.570
Free acidity as benzoic acid	18°C. minimum
Setting Point	0.05 percent maximum
Specific gravity 25°/4°C.	98 percent minimum
Refractive index n/d 20°C.	0.1 percent maximum

Methods of Testing

The properties enumerated in the above specification shall be determined in accordance with the following methods of test:

3. Appearance—Color.

The color shall be determined by the Gardner color standard. Prepare the following stock solutions:

A. Dissolve 2083 gm. of $FeCl_3 : 6H_2O$ in 500 ml. of 2 percent HCl solution.
B. Dissolve 166.6mg. of $CoCl_2 : H_2O$ in 500 ml. of 2 percent HCl solution.
C. Add 100 ml. of 37 percent iron-free HCl to 1750 ml. of distilled water to obtain 2 percent HCl solution.

Prepare the individual standards by mixing the amounts of the above stock solutions indicated in the following tables.

Gardner Color Standards

Color No.	1	2	3	4	5
Ml. Solution A	0.13	0.19	0.29	0.43	0.65
Ml. Solution B	0.19	0.29	0.43	0.65	0.97
Ml. Solution C	99.68	99.52	99.28	98.92	98.35

Place the standards in clean, dry, tightly stoppered two-ounce square bottles, four-ounce oil sample bottles, or similar containers. These standards should remain good indefinitely, if kept tightly stoppered. Compare the color of the material to be tested in bottles of the same type and size with the standards, using either direct daylight or indirect artificial transmitted light, the latter being preferred. The number of the colored standard matched by the material being tested is reported as the color.

4. Setting point.

Fill a 1- by 8-inch test tube with sample to a depth of about 3½ inches and cool in a water bath to about 18°C. Place the tube containing the cooled sample inside an air jacket (a 2 by 7 inch test tube) supported in a water bath maintained at 13 ± 2°C. Seed the sample with a small amount of material from a previously frozen sample and stir with a precision thermometer (ASTM standard thermometer, —35°C. to 54.0°C.) until the temperature of the sample rises to a maximum. This will require a considerable period of time, sometimes as much as 15 to 30 minutes, because of the very slow rate of crystallization and low latent heat of fusion of benzyl benzoate. Record the maximum temperature reached as the setting point and report to the nearest 0.1°C.

5. Specific gravity.

Determined by any suitable method that is accurate to the third decimal point.

6. Refractive index.

Determined by means of an Abbe refractometer or equivalent instrument, taking the average of at least three readings.

7. Total chlorine.

Determined by the Parr type oxygen bomb method as follows:

Accurately weigh 1.5 grams of sample by difference from a dropper weighing bottle into the combustion cup of the oxygen bomb. Attach 10 cm. of ignition wire to the bomb electrode. Place the cup in its receptacle on the grounded electrode and arrange the wire to touch the surface of the sample without touching the walls of the cup. Add 5 ml. of distilled water to the bomb, assemble and fill with oxygen. About 1 atmosphere of oxygen should be used for each 0.1 gram of sample, plus about 2 atmospheres.

Connect the firing circuit to the bomb. Fill the safety shield with enough water to come up to the screw cap of the bomb and lower the bomb into it. After firing the bomb the walls should be hot if the sample burned properly. Set the bomb in water bath and cool 15 minutes.

Release the pressure by allowing the gas to bubble slowly through a water trap, then remove the cap and carefully rinse the bomb and head electrode, cup and inner walls into a 150 ml. beaker. Place the cup and needle valve assembly in the bomb and just cover the cup with water. Replace the head and heat the bomb over a flame until the water boils vigorously. Transfer the water to the beaker and repeat the procedure until three boiling water washes have been given the bomb.

If the volume of the combined water washes exceed 150 ml. evaporate down to 125 ml. To the solution, containing the chlorine in combination as a chloride, add sufficient concentrated nitric acid to make the solution acid and then add about 5 ml. excess. Dilute to about 150 ml. and add an excess of 0.1N silver nitrate solution. The precipitated silver chloride is filtered off and washed free of silver nitrate. The filtrate and washings are treated with 5 ml. of saturated solution of ferric ammonium alum and the excess silver determined by titration with 0.1N ammonium or sodium thiocynanate solution. Each addition of reagent will produce a temporary reddish-brown color which immediately fades as long as silver uncombined with thiocyanate remains. The end point is reached when the excess trace of thiocyanate remains. The end point is reached when the excess trace of thiocyanate produces a permanent reddish-brown color of ferric thiocynanate, seen best against a white background. From this titration the amount of nitrate used by the chloride is ascertained.

One ml. 0.1N $AgNO_3$=0.003546 gm. Cl.

8. Ester content.

Shall be determined by method 517.1 of Specification TT-P-141.

9. Free Acidity as Benzoic Acid.

Shall be determined by method 525.2 of Specification TT-P-141.

CSMA 61-5
Determination of 2-Butyl, 2-Ethyl 1-3 Propandiol*
(Tentative)

Scope

1. This method defines the quality of 2-Butyl, 2-Ethyl 1,3 Propanediol when used in insect repellent formulations for treating clothing.

Properties

2. The material shall conform to the following requirements.

Appearance	White crystalline solid, 2 Gardner color standard at 50°C.
Odor	Faint odor, which is characteristic.
Freezing Point	40-41.8°C.
Free acidity as propionic acid	0.05 percent maximum

Methods of Testing

The properties enumerated in the above specifications shall be determined in accordance with the following methods of test:

3. *Appearance—Color*

The color shall be determined by the Gardner color standard. Prepare the following stock solutions:

A. Dissolve 2083 gm. of $FeCl_3:6H_2O$ in 500 ml. of 2 percent HCl solution.

B. Dissolve 166.6 gm. of $CoCl_2:6H_2O$ in 500 ml. of 2 percent HCl solution.

C. Add 100 ml. of 37 percent iron-free HCl to 1750 ml. of distilled water to obtain 2 percent HCl solution.

Prepare the individual standards by mixing the amounts of the above stock solutions indicated in the following tables:

Gardner Color Standards

Color No.	1	2	3	4	5
Ml. Solution A	0.13	0.19	0.29	0.43	0.65
Ml. Solution B	0.19	0.29	0.43	0.65	0.97
Ml. Solution C	99.68	99.52	99.28	98.92	98.35

Place the standards in clean, dry, tightly stoppered two-ounce square bottles, four-ounce oil sample bottles, or similar containers. These standards should remain good indefinitely, if kept tightly stoppered. Compare the color of the material to be tested in bottles of the same type and size with the standards, using either direct daylight or indirect artificial transmitted light, the latter being preferred. The number of the colored standard matched by the material being tested is reported as the color.

4. *Freezing Point*

Fill a 1- by 8-inch test tube with sample to a depth of about 3½ inches and cool in a water bath to about 43°C. Place the tube containing the cooled sample inside an air jacket (a 2 by 7 inch test tube) supported in a water bath maintained at 35 ± 2°C. Seed the sample with a small amount of material from a previously frozen sample and stir with the precision thermometer (ASTM standard thermometer, —36°C. to 54.0°C.) until the temperature of the sample rises to a maximum. This will require a considerable period of time, sometime as much as 15 to 30 minutes, because of the very slow rate of crystallization and low latent heat of fusion of benzyl benzoate. Record the maximum temperature reached as the setting point and report to the nearest 0.1°C.

5. *Free Acidity as Propionic Acid*

Shall be determined by method 525.2 of Specification TT-P-141.

*Method extracted from Military Specification MIL-R-12123A, 27 January 1953.

CSMA 61-6
Qualitative Test for Chlordane
(Tentative)

Scope

1. This method describes a qualitative test for chlordane. The addition of Davidow's reagent to a hexane or benzene solution of chlordane produces a distinct red color.

Reagent

2. Davidow's reagent: One volume of diethanolamine to two volumes of 1N alcohol potassium hydroxide.

Procedure

3. Prepare a solution of the sample containing about 0.5 mg chlordane per ml solvent (hexane or benzene). Add 1 ml of this solution to 3 ml Davidow's reagent (a) in a test tube and heat for 30 minutes in a boiling water bath. In the presence of chlordane a distinct red color is produced.

Quantitative method

4. B. Davidow, J. Asso. Official Agr. Chemists, *35*, 886 (No. 3, 1950).

CSMA 61-7
Method for the Determination of Chlorine in Chlordane
(Official)

Scope

1. This method describes procedures for the determination of total chlorine in chlordane; total chlorine in dusting or water miscible powders containing chlordane; total chlorine in various mineral oil sprays containing chlordane and the amount of chlordane in mineral oil or water miscible concentrtaes.

METHOD FOR THE DETERMINATION OF TOTAL CHLORINE IN CHLORDANE

Procedure

2. Method I

Weigh a quantity of sample containing from 0.20 to 0.30 g of technical chlordane into a 100 ml volumetric flask, (or 0.50 to 0.75 g into a 250 ml volumetric flask), dissolve in 10 ml thiophene-and chlorine-free benzene and dilute to volume with 99% isopropanol. Transfer a 25 ml aliquot of the isopropanol solution to a 300 ml 24/40 standard tapered Erlenmeyer flask. Add 35 ml 99% isopropanol, 4.0 g of freshly cut small pieces of metallic sodium, and shake the flask to mix the sample with the alcohol.

Connect to a reflux bulb-type condenser and boil gently for 2½ hours. If necessary, add more sodium as an excess should be present at all times in the alcohol solution during the reduction. Shake the flask occasionally. Eliminate excess sodium by cautiously adding 10 ml of 50 percent isopropanol through the condenser at the rate of 1-2 drops per second. Boil for an additional 10 minutes, and then slowly add 60 ml of water. Disconnect the flask and boil for 15 - 30 minutes to remove the benzene and alcohol.

The chlorine may then be determined by one of the following methods:

(a) Cool the flask, and transfer the contents to a 250 ml beaker. Add 2-3 drops of phenolphthalein solution, neutralize by adding nitric acid (1-1), and then add 10 ml in excess. Add a slight excess of N/10 silver nitrate and digest on steam bath with frequent stirring until the silver chloride is coagulated. Cool, filter through a fast qualitative paper, and wash thoroughly with distilled water. Add 5 ml of saturated ferric alum solution, and determine the excess silver nitrate in the filtrate by titration with N/10 potassium thiocyanate. Subtract the quantity of silver nitrate found in the filtrate from that originally added. The difference will be that required to combine with the chlorine in the chlordane. One ml of N/10 silver nitrate is equivalent to 0.0035457 g of chlorine. Technical chlordane contains 63-65% chlorine, or an average of 64%. To obtain the percentage of chlordane multiply the chlorine value by 1.5625.

(b) Cool the flask, add 2-3 drops of phenolphthalein solution, neutralize by adding nitric acid (1-1) and then add ml in excess. Add N/10 silver nitrate from a buret, in excess of the quantity necessary to precipitate all the chlorine. Then add 5 ml of nitrobenzene and 0.5 g ferric sulfate. Swirl flask to coagulate the precipitate. Back-titrate excess silver nitrate with N/10 potassium thiocyanate until faint pink color appears. Cross titrate with both standard solutions, crossing end point in each direction (End point, which is not too sharp, is more easily perceived in this way). Calculate percentage of chlordane as in (a) from the quantity of silver nitrate required for the titration.

(c) Cool the flask, add 2-3 drops of phenolphthalein and neutralize with nitric acid (1-1), then 6 ml excess. Cool the flask to room temperature and then transfer the contents to a 600 ml beaker. The volume of solution should be 200-250 ml. Titrate the chlorine with N/10 silver nitrate using silver - silver chloride electrodes on an electrometric titrimeter (Fisher titrimeter or the equivalent). Calculate the percentage of chlordane as in (a).

3. Method II

METHOD FOR THE DETERMINATION OF TOTAL CHLORINE IN DUSTING OR WATER MISCIBLE POWDERS CONTAINING CHLORDANE

Weigh a quantity of sample containing from 0.50 to 0.75 g of technical chlordane into a 100-200 ml volumetric flask, and add exactly 100 ml of chlorine and thiophene-free benzene. Shake well for about ten minutes until the chlordane is dissolved and the solution is well mixed. Allow to settle and transfer a 10 ml aliquot to a 300 ml 24/40 standard tapered Erlenmeyer flask. Add 50 ml of 99% isopropanol, 4.0 g of freshly cut small pieces of metallic sodium, and shake the flask to mix the benzene extract of the sample with the alcohol.

Connect to a reflux bulb-type condenser and boil gently for 2½ hours. If necessary, add more sodium as an excess should be present at all times in the alcoholic solution during the reduction. Shake the flask occasionally. Eliminate excess sodium by cautiously adding 10 ml of 50 percent isopropanol through the top of the condenser at the rate of 1-2 drops per second. Boil for an additional 10 minutes, and then slowly add 60 ml of water. Add 5 ml of 30 percent hydrogen peroxide, a few drops at a time, through the top of the condenser. Heat the mixture to boiling and boil for 15 minutes. Add 5 ml more of 30 percent hydrozen peroxide and boil again for 15 minutes. If sulfur is present in the dust or powder, it may be necessary to add additional hydrogen peroxide to convert the sulfides to sulfates. Disconnect the flask and boil for 15-30 minutes to remove the benzene and alcohol.

In absence of plant extractive material, oils, or emulsifying agents, proceed as directed in Method I, third paragraph. The chlorine may then be determined by one of the following methods: (a), (b) or (c).

In the presence of plant extractive material, oils, or emulsifying agents, cool the solution after boiling off the benzene and isopropyl alcohol. Add 2 or 3 drops of phenolphthalein solution, neutralize by adding nitric acid (1-1) dropwise and then 10 ml in excess. Cool, if necessary, to room temperature, transfer contents to flask and aqueous washings to a small separatory funnel, and shake with 15 ml of a mixture of equal volumes of isoamyl alcohol and ethyl ether. Draw off the aqueous layer into a second separatory funnel and extract again with 15 ml of the isoamyl alcohol-ethyl ether mixture. According to which procedure is to be used for the titration of chlorine, draw off the aqueous layer into either a 250 ml beaker, a 300 ml Erlenmeyer flask, or a 600 ml beaker. Wash the two extracts successively with three 10 ml portions of water. The chlorine may then be determined as in Method I, third paragraph, (a), (b), or (c).

4. Method III

METHOD FOR THE DETERMINATION OF TOTAL CHLORINE IN VARIOUS MINERAL OIL SPRAYS CONTAINING CHLORDANE

Transfer a quantity of sample containing 0.050 to 0.075 g of technical chlordane to a 300 ml 24/40 standard tapered Erlenmeyer flask. Add 60 ml of 99% isopropanol, 4.0 grams of freshly cut small pieces of metallic sodium, and shake the flask to mix the benzene extract of the sample with the alcohol.

From this point proceed as directed in second and fourth paragraphs in Method II.

5. Method IV

METHOD FOR THE DETERMINATION OF CHLORDANE IN MINERAL OIL OR WATER MISCIBLE CONCENTRATES

Transfer a quantity of sample containing from 0.50 to 0.75 g of technical chlordane into a 100 ml volumetric flask and dilute to volume with 99% isopropanol. Mix well and transfer a 10 ml aliquot of the isopropanol solution to a 300 ml 24/40 standard tapered Erlenmeyer flask. Add 50 ml 99% isopropanol, 4.0 g of freshly cut small pieces of metallic sodium, and shake the flask to mix the sample with the alcohol.

(2) From this point proceed as directed in second and fourth paragraphs in Method II.

6. Notes on Methods I, II, III, IV

A. A blank should be run on the reagents used in these procedures. Prior to the addition or titration of the solution with N/10 silver nitrate, add 5-10 ml of N/10 sodium chloride.

B. It is not recommended that aqueous emulsions of technical chlordane be analyzed directly by this method as low results may be obtained. If the emulsion can be broken upon the addition of a mineral acid, the oil can be extracted with ether and alcohol and the chlorine analysis made on the extract after removal of the ether in a slow stream of air. Dehydration may also be accomplished by placing the flask and sample charge in a vacuum dessicator containing phosphorus pentoxide.

C. When the electrometric titration procedure, Method I, third paragraph, (c), is employed it is advisable to take the minimum size sample mentioned so that the final titration with N/10 $AgNO_3$ will not exceed the capacity of a 10 ml burette graduated in 1/20 milliliters.

D. This method is not specific for technical chlordane and should not be used in the presence of other chlorinated organic compounds such as DDT,

DDD, chlorinated camphene, benzene hexachloride, methoxychlor, etc.

7. *References:*

Umhoeffer, Ind. & Eng. Chem. Anal. Ed., 15, (1943), pp. 383.
J.A.O.A.C., Vol. 30, p. 319, 1947.
J.A.O.A.C, Vol. 31, p. 368, 1948.
J.A.O.A.C., Vol. 31, p. 368, 1948.
Technical Bulletin No. 216, Velsicol Corporation, Chicago, Ill.

CSMA 61-8
Determination of Chlorine or Bromine in Organic Compounds
(Tentative)

Sodium Biphenyl Method

Scope

1. This method can be used in place of the sodium reduction method for the determination of chlorine or bromide in organic compounds. The sodium biphenyl reagent is extremely reactive and rapidly dehalogenates the compound but it is decomposed by water, alcohols, and acids, which may cause the method to fail.

Reagent

2. Sodium biphenyl reagent: A solution of sodium biphenyl in toluene and ethylene glycol dimethyl ether. It may be prepared by Liggett's method (1), or purchased from Southwestern Analytical Chemists (2).

Procedure

3. Weigh a sample containing 20 to 150 mg chlorine (35 mg for the potentiometric determination) into a 125 ml or 250 ml separatory funnel containing 20 ml of benzene and take a suitable aliquot for analysis. (Other chlorine-free, dry solvents other than alcohols or acids may be used.) Add 20 ml of sodium biphenyl reagent, (the contents of a bottle of purchased reagent), stopper, and mix, venting the separatory funnel carefully as the contents usually become quite warm. The reaction is complete in one or two minutes and the mixture should have a green or green-brown color indicating an excess of reagent. If the solution is brown, the reaction may be incomplete and more reagent must be added; however, the determination should be abandoned if it is believed that a large quantity of interfering substances is present. Use of a small sample minimizes the interference.

Add water a few drops at a time to decompose the excess of reagent, then add 25 ml water and shake gently to avoid the formation of an emulsion. Transfer the aqueous layer to a second separatory funnel containing 25 ml ether, shake, allow to separate, and transfer the aqueous layer to a beaker. Repeat the extraction with two 25 ml portions of nitric acid (1+9), collecting the extracts in the same beaker. The solution should now be acid. Determine the chloride by potentiometric, gravimetric, or Volhard methods, as in the sodium reduction method. See Official Methods of Analysis, A.O.A.C., 8th Edition, p. 80, par. 5.153 (1955).

References

4. (a) Liggett, L. M., Anal. Chem. *26*,
(b) Organic Halogen Reagent (Sodium Biphenyl Solution). Catalogue No. 500. One package approx. $16.00.
Southwestern Analytical Chemicals, P.O. Box 485 Austin 63, Texas.

CSMA 61-9
Determination of Organically Bound Chlorine
(Official)

Scope

1. This method describes a procedure for the determination of organically bound chlorine in insecticidal toxicants and formulations.

Apparatus

2. 250 ml. g.s. Erlenmeyer Flask Condenser, bulb or Allihn Burette, 50 ml. or 25 ml. Hot Plate.

Reagents

3. (a) Isopropanol, 99%.
(b) Isopropanol - water, 1:1; Dilute 99% isopropanol with an equal volume of distilled water.
(c) Sodium metal
(d) Silver nitrate solution, 0.1N
(e) Potassium (or ammonium) thiocyanate solution, 0.1N
(f) Nitric acid, 1:1. Dilute concentrated reagent grade nitric acid with an equal volume of distilled water. Boil to remove oxides of nitrogen and store protected from light.
(g) Ferric alum indicator, 40 grams of ferric ammonium sulfate dissolved in 100 ml. of distilled water. Add several ml. of concentrated nitric acid to discharge the red color.
(h) Phenolphthalein, 1% 1.0 grams dissolved in 50 ml. of alcohol and diluted to 100 ml. with distilled water.

Procedure

4. For technical grade materials, water-dispersible powders and dust concentrates, weigh accurately 0.9 to 1.0 gram of sample, transfer to a 250 ml. volumetric flask, add 10 ml. of thiophene-free benzene to dissolve the sample, and then make up to volume with 99% isopropanol. Transfer a 25 ml. aliquot to a 250 ml. standard tapered, Erlenmeyer flask.

Add 2.5 grams of metallic sodium in the form of ribbon or cut in small pieces, and shake the flask to mix the sample with the alcohol. Connect to a reflex condenser and boil gently for two hours. Shake the flask occasionally. Eliminate excess metallic sodium by cautiously adding 10 ml. of 50% isopropanol through the condenser at the rate of 1-2 drops per second. Boil for an additional ten minutes, and then add 60 ml. of water.

Cool, add 2-3 drops of phenophthalein solution; neutralize by adding 50% nitric acid dropwise, and then add 10 ml. in excess. Cool to room temperature, add a slight excess of 0.1N silver nitrate, and coagulate the precipitated silver chloride by digesting on a steambath for 30 minutes, with frequent stirring.

Add 5 ml. of ferric-alum indicator and determine the excess silver nitrate in the filtrate by titration with 0.1N potassium thiocyanate. Subtract the quantity of silver nitrate found in the filtrate from that originally added. The difference will be that required to combine with the chlorine in the toxicant. One ml. of 0.1N silver nitrate is equivalent to 0.003546 grams of chlorine.

For emulsifiable or oil concentrates or solutions, weigh accurately 0.08 to 0.10 grams of sample, then proceed as above: "transfer to a 250 ml. volumetric flask . . . "

Compute the percentage chlorine in the sample by the equation:

$$a = \frac{b \times 0.3547}{\text{Weight of sample grams}}$$

a = Percentage chlorine

b = Net number of mls. of 0.1N silver nitrate used

Multiply *a* by *F* to obtain percentage toxicant, where

$$F = \frac{100}{\text{pct. chloride in toxicant}}$$

CSMA 61-10
Qualitative Tests for Rapid Identification of Chlorinated Hydrocarbons in Insecticide Formulations
(Tentative)

Scope

1. This test is presented in an effort to help solve the problem of analyzing commercial preparations containing polychlorinated hydrocarbon insecticides. Since there are no specific quantitative methods suitable for control purposes for some of these materials, the analyst is often forced to resort to total chlorine analysis for their determination. In doing so, he has to assume that the guaranteed ingredient and no other is present. In order to eliminate some of the uncertainty involved in these analyses, the author has attempted to find or develop simple qualitative "test tube" tests which can be conveniently used to detect and identify the commonly used polychloro insecticides. These methods should be specific enough to be applied to mixtures, as well as simple enough for routine use.

While the tests described are designed primarily for dusts, they may also be applied directly to liquid preparations, provided the amount of the liquid can be restricted to a very small volume; since the liquids usually contain substances which carbonize with the strong acids, large quantities may mask the

colors. Therefore, to check liquids containing only small percentages of the polychloro insecticides, it may be necessary to isolate the insecticides by partition chromatography.

These tests were successfully applied to a wide variety of commercial products containing many of the commonly used pesticides. Also, various combinations of the polychloro insecticides were mixed with other pesticide materials, and by using these tests, each was positively identified.

Selected tests for 9 of the more common chlorinated organic pesticides are summarized in Table 1 and are described in detail in the following sections of this presentation.

Procedures

2. METHOD I. CHLORDANE

Chlordane is identified by its reaction with ethylene glycol and 1N ethanolic KOH to produce a wine-red color. This test is a slight variation of the Ard (1) method; the only differences are that powders are analyzed by making the test on an n-hexane extract. Ethylene glycol is substituted to revent the interference of technical heptachlor which also reacts with ethylene glycol monoethyl ether to give a color similar to that produced by technical chlordane.

The Davidow (2) method is much more sensitive than the present one but heptachlor, a component of technical chlordane, will also give the test. This would therefore prevent use of the Davidow procedure in detecting technical chlordane in technical heptachlor preparations.

3. METHOD II. METHOXYCHLOR

This method is described in a paper entitled "Qualitative Test for Methoxychlor," released by Grasselli Chemicals Department, E. I. du Pont de Nemours & Co., Wilmington, Delaware. It is based on the Fairing and Warrington (3) colorimetric method for the determination of residues on food crops. The methoxychlor is dehydrochlorinated with ethanolic KOH and the resulting 1,1-dichloro-2,2-bis (p-methoxyphenyl) ethylene reacts with 95% H_2SO_4 to produce a red color. The test is sensitive to less than 1 microgram of methoxychlor, and it can be applied in the presence of the other polychloro insecticides without interference.

4. METHOD III. TOXAPHENE

Johnson (4) published a test for toxaphene (technical chlorinated camphene containing 67-69% chlorine) based on its reaction with pyridine and methanolic KOH to produce a red color. Although none of the other commonly used polychloro insecticides interfere in this test, the more recently introduced Strobane, which also contains chlorinated camphene, produces a similar color.

5. METHOD IV(A). DDD (DICHLORODIPHENYLDICHLOROETHANE)

After dehydrochlorination DDD is detected by its production of a red color with a mixture of H_2SO_4 and HNO_2.

Reagents

(a) Ethanolic NaOH.—0.5N.

(b) H_2SO_4-HNO_2 mixture.—Add 1 drop of concentrated HNO_2 to 50 ml concentrated H_2SO_4. Store in a tightly closed glass-stoppered bottle.

Procedure

Extract the sample with n-hexane and transfer a portion containing from 0.1 to 1.0 mg DDD to a Pyrex test tube. Evaporate almost to dryness and add 3 drops of 0.5N ethanolic NaOH. Place test tube in a hot-water bath and continue evaporation to dryness (Note 1). Cool, add 2 ml of the H_2SO_4-HNO_2 mixture, and shake. A bright red color lasting about 1 minute will develop if DDD is present.

Discussion

Interference in this test from the other polychloro insecticides is limited to methoxychlor which produces a color similar to that of DDD. The methoxychlor color may be recognized, however, by both its greater stability and its tolerance for moisture. It remains without apparent change for 10 minutes or longer while the DDD color fades after about 1 minute. Also, the methoxychlor color will remain unchanged after the addition of 4 or 5 drops of water whereas the DDD color will disappear completely after the addition of only 2 or 3 drops.

This test is sensitive down to about 3 to 5 micrograms DDD, and, by increasing the concentration of the HNO_2, even smaller quantities can be detected. If HNO_2 concentration is too great, however, large amounts of DDT, if present, will give a faint pink color.

6. METHOD IV(B). DDD (IN PRESENCE OF METHOXYCHLOR)

While not quite as sensitive as Method IV(A), this test will readily detect 1 mg of DDD. It is applicable in the presence of methoxychlor as well as the other polychloro insecticides.

Reagents

(a) Ethanolic NaOH.—0.5N.

(b) Acetic anhydride. — Reagent grade.

Procedure

Extract the sample with benzene, and transfer a portion containing 1-10 mg DDD to a Pyrex test tube. Add 2 or 3 drops of 0.5N ethanolic NaOH and evaporate to dryness by heating in a hot water bath while directing a gentle current of air into the tube (Note 2). Cool, and add 4 drops of acetic anhydride and 2 ml concentrated H_2SO_4. If DDD is present, an orange color will develop (Note 3).

7. METHOD V. DDT (DICHLORODIPHENYLTRICHLOROETHANE)

As in the test for DDD, DDT is first dehydrochlorinated and then reacted with a mixture of H_2SO_4 and HNO_2 to produce a characteristic green color.

Reagents

(a) Ethanolic NaOH.—0.5N.

(b) Carbon tetrachloride. — Reagent grade.

(c) H_2SO_4-HNO_2 mixture.—Add 1 ml concentrated HNO_2 to 30 ml concentrated H_2SO_4. Store in a tightly closed glass-stoppered bottle.

Procedure

Extract the sample with n-hexane and transfer a portion containing 0.2-2.0 mg DDT to a Pyrex test tube. Add 3 drops of 0.5N ethanolic NaOH and evaporate to dryness by placing the test tube in a hot water bath (Note 4). Cool and add 4 or 5 drops of carbon tetrachloride to redissolve the sample. Add 2 ml of the H_2SO_4-NHO_2 mixture and shake vigorously. A green color, lasting for about 1 minute will form after about 5 seconds of shaking if DDT is present.

Discussion

When large amounts of DDT are present, a flash red color will appear as soon as the acid mixture is added. This color is temporary and almost immediately changes to green. The green color is due primarily to the p,p'-isomer of DDT. The o,p'-isomer produces a pale yellowish-green color which becomes pink with continued shaking.

DDD and methoxychlor, both of which produce red colors, are the only polychloro insecticides offering interference in this test, but neither of these is serious. The DDD color vanishes within about 5 seconds after the addition of the acid while methoxychlor in amounts of 3 mg or less is well masked by the DDT color. When larger quantities of methoxychlor are present, the DDT can usually be recognized by the appearance of a pinkish-brown color after the methoxychlor red and the DDT green colors have vanished. This color may not always be distinct if only small quantities of DDT are present because it is due to the o,p'-isomer of DDT, and according to Haller, et al. (5) this isomer comprises only about 19 per cent of technical DDT.

Note 1: If sulfur or organic materials which will carbonize with the acid are present, at this point cool and extract with about 1 ml hexane. Filter the extract through a small cotton plug into a second test tube, evaporate the hexane, and proceed with the color development.

Note 2: If sulfur or organic materials which will carbonize with the acid are present, at this point cool and extract with about 1 ml hexane. Filter extract through a small cotton plug, into a second test tube, evaporate hexane, and proceed with the addition of the acetic anhydride.

Note 3: DDT produces a light orange color when subjected to this treatment; however, upon the addition of a trace of HNO_2, DDD becomes red while DDT is recognized by the formation of a pale green color.

Note 4: If sulfur or organic materials which will carbonize with the acid are present, at this point cool and extract with about 1 ml hexane. Filter extract through a small cotton plug into a second test tube, evaporate hexane, and proceed with the addition of the carbon tetrachloride.

This test will readily detect as little as 50 micrograms DDT, and by cooling the acid mixture in an ice bath before making the test it is possible to detect even smaller quantities. Besides increasing the sensitivity of the test, the cooling of the acid also delays the fading of the color.

8. METHOD VI(A). HEPTACHLOR

This test is specific for heptachlor, and under proper conditions it will clearly detect as little as 0.3 mg.

Reagents

(a) Aniline.—Redistilled.

(b) Pyridine.—Reagent grade.

(c) Methanolic KOH.—0.1N.

Procedure

Extract the sample with benzene and transfer a portion (not more than 0.5 ml) containing from 1 to 5 mg heptachlor to a Pyrex test tube. Add 5 drops of aniline and 2 drops of 0.1N methanolic KOH; then place the test tube in a hot-water bath for 15 seconds. Remove and add 1 ml pyridine. Shake and again place the test tube in the hot-water bath for 10 seconds. Shake and allow to stand. If heptachlor is present, a dark green color will develop within 1 to 3 minutes after the addition of the pyridine.

Discussion

The conditions under which this test is made are rather critical; therefore, the directions must be followed carefully if it is to be successfully applied.

Although none of the other polychloro insecticides produce colors which interfere in this test, excessive quantities of those which are dehydrochlorinated with alcoholic alkali will inhibit the formation of the heptachlor color. When only small quantities of these materials are present, it is sometimes possible to develop the color by adding 2 or 3 additional drops of the methanolic KOH after the pyridine has been added. When large quantities are present, and when sulfur is present, it is recommended that Method VI(B) be used.

9. METHOD VI(B). HEPTACHLOR

Although rather simple, this test will readily detect 1 mg of heptachlor in the presence of any or all of the other chlorinated insecticides.

Reagents

(a) Methanolic KOH.—0.1N.

Procedure

Extract the sample with benzene and transfer a portion (not more than 0.5 ml) to a Pyrex test tube. Add 1 ml 0.1N methanolic KOH, mix, and place in a hot-water bath for 50 seconds. Add 1 ml benzene and mix well. If heptachlor is present, a pink to purple color will develop.

In the presence of sulfur, or organic materials such as rotenone, pyrethrum, or ferbam, extract the sample with n-hexane and transfer a portion containing about 1 mg heptachlor to a test tube. Add 4 or 5 drops of 0.5N ethanolic NaOH and evaporate to dryness in a hot-water bath. Cool, extract with about 1 ml n-hexane, and filter through a small cotton plug into a second test tube. Evaporate the hexane, redissolve in about 0.5 ml benzene, and add 1 ml 0.1N methanolic KOH. Heat in the hot-water bath for 50 seconds, add 1 ml benzene, and mix well. If heptachlor is present, a pink to purple color will develop.

10. METHOD VII(A). ALDRIN, DIELDRIN*, AND ENDRIN

All of these materials react with fuming H_2SO_4 in xylene to produce red colors, but they are identified by the varying speeds with which they react. None of the other polychloro insecticides interfere.

This test is specifically recommended only for the identification of dieldrin. For aldrin, Method VII(B) is more definite, while for endrin Method VII(C) is recommended.

Reagents

(a) Xylene.—Reagent grade.

(b) Fuming H_2SO_4 mixture. — Mix one part of 30% fuming H_2SO_4 with four parts of concentrated H_2SO_4. Store in a tightly closed glass-stoppered bottle.

Procedure

Extract sample with xylene (Note 5) and adjust volume so that each ml contains about 10 mg of the toxicant under test. Mix well and transfer 0.1 ml to a dry test tube (preferably glass stoppered). Add 2 ml of the H_2SO_4 mixture and shake vigorously for about 30 seconds. Interpret the results by the following descriptions:

(1) Dieldrin.—If dieldrin is present, an intense red color will form immediately upon the addition of the H_2SO_4. Sensitivity = 0.5 mg.

(2) Aldrin.—After the test tube is shaken for about 10 seconds, a pink color, gradually becoming intensely red with continued shaking, will develop if aldrin is present. Sensitivity = 0.2 mg.

(3) Endrin.—Endrin is recognized by the slow development of a red color after about 15 seconds of shaking. This color is somewhat less intense than that of either dieldrin or aldrin. Sensitivity = 0.05 mg.

11. METHOD VII(B). ALDRIN

(In presence of dieldrin and endrin)

This test is designed to detect aldrin when either dieldrin or endrin is present.

Reagents

(a) Xylene.—Reagent grade.

(b) Fuming H_2SO_4 mixture. — Mix one part of 30% fuming H_2SO_4 with four parts of concentrated H_2SO_4. Store in a tightly closed glass-stoppered bottle.

Procedure

Extract the sample with benzene and transfer 2 or 3 drops to a glass-stoppered test tube. Add 2 ml of the H_2SO_4 mixture and shake vigorously for 30 seconds. If as much as 2 mg of aldrin is present, a pink to red color will develop. (Notes 6, 7, 8).

12. METHOD VII(C). ENDRIN

(In presence of dieldrin and aldrin)

Endrin, which obviously cannot be detected in the presence of dieldrin or aldrin by Method VII(A), can be specifically identified, without interference from any of the other polychloro insecticides, by its reaction with concentrated H_2SO_4 in n-hexane.

Procedure

Extract the sample with n-hexane and transfer a portion (not more than 0.3 ml; containing from 1 to 5 mg endrin) to a Pyrex test tube. Add 2 ml concentrated H_2SO_4 and shake thoroughly. If dieldrin is present, at this point a dull short-lived pink color will appear. Endrin produces a yellow color and aldrin remains colorless. Place the test tube in a beaker of boiling water and heat for 30 to 40 seconds. Remove tube and allow to cool at room temperature. If either endrin or chlordane is present, a pink to red color will develop. (Aldrin and dieldrin both produce yellowish-brown solutions.) Add 1 drop of a 1 to 1 mixture of H_2SO_4 and HNO_3 and shake. The presence of endrin is confirmed by the formation of a blue-green color. (Note 9).

Discussion

This test will readily detect 0.2 mg endrin, and by reducing the volume of H_2SO_4, even smaller quantities are perceptible.

Although the red color is not absolutely stable, it will remain without

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*Method VII(A). — In testing dieldrin alone conc. H_2SO_4 may be substituted for fuming H_2SO_4 mixture.

Note 5: Organic materials such as rotenone and pyrethrum, which carbonize with acid, must be eliminated from the solution before this test can be satisfactorily performed. Usually this can be accomplished by extracting the sample with n-hexane rather than with xylene, and by adding a pinch of activated carbon to the extract. Filter through a small cotton plug covered lightly with Filter-cel, evaporate the hexane, and proceed with the color development on the residue. If activated carbon fails to eliminate the interfering substances, it may be necessary to subject the hexane extract to partition chromatography with silicic acid as the supporting medium and n-hexane and nitromethane as the solvents. With D & C Red No. 18 as the indicating dye, aldrin is obtained by collecting the effluent solvent just preceding the red band. Both dieldrin and endrin follow immediately behind the dye. The mobile solvent is then evaporated and the tests made on the residue.

Note 6: See note for Method VII(A) (Note 5).

Note 7: Dieldrin, while orange at first, gradually acquires a yellow color with continued shaking.

Note 8: It is recommended that a duplicate test with the xylene omitted be run along with the original. By comparing the two, the aldrin color is more clearly emphasized.

Note 9: See note for Method VII(A) (Note 5).

apparent change for 20 to 30 minutes. Therefore it is possible to obtain a rough quantitative estimate of technical endrin by comparing the resulting red color to a series of standards processed along with the sample (Table 2). Obviously this estimate is limited to samples free of chlordane as well as aldrin and dieldrin, and for this application it is necessary that the reaction be carried out under strictly controlled conditions as follows:

Prepare a standard solution containing 10 mg technical endrin per ml n-hexane. Using a buret or a graduated pipet, transfer exactly 0.10, 0.15, 0.20, and 0.25 ml to the first 4 of 5 similar test tubes. Extract a sample of the unknown and transfer from 0.1 to 0.25 ml. calculated to contain about 2 mg technical endrin, to the fifth test tube. Adjust the volume of hexane in each test tube to 0.25 ml. and treating one at a time, add 2 ml concentrated H_2SO_4 and shake for 10 seconds. Immediately place tube in a boiling water bath and allow to heat for exactly 30 seconds. Remove the test tube from the water bath and let it stand for 90 seconds at room temperature; then place it in an ice bath for 2-3 minutes. After all the test tubes have been processed, determine the approximate amount of technical endrin in the unknown by comparing its color intensity to the standards while holding the tubes toward a light source.

Table 2.—Estimation of Technical Endrin by Comparison with Known Concentrations

Endrin Present (Per Cent)	*Observer A*	*Observer B (Per Cent)*	*Observer C*
2	2	2	2
4	4	4	4
6	6	6	6
10	10	10	10

13. METHOD VII(D). DIELDRIN AND ENDRIN

Although it does not differentiate between the two, this test is specific for dieldrin and endrin. It is based on their reaction with sulfur and ethanolic NaOH.

Reagents

(a) Elemental sulfur.
(b) Ethanolic NaOH.—0.5N.

Procedure

Extract the sample with benzene, and transfer a portion containing 5-20 mg to a 300 ml Erlenmeyer flask designed to fit a ground glass water-cooled reflux condenser. Evaporate the benzene by heating on a steam bath while directing a gentle current of air into the flask. Pipet 20 ml 0.5N ethanolic NaOH into the flask and swirl until the residue is dissolved. Add 30 mg sulfur and attach the flask to reflux condenser. Heat the solution on a hotplate just to the boiling point and allow it to digest for 15 minutes. Remove from the hotplate and let it stand at room temperature 20-30 minutes with occasional swirling. If dieldrin or endrin is present, a pink to orange-red color will develop. (Notes 10, 11)

Note 10: With the exception of large quantities of chlordane and heptachlor, which produce brown colors, the other polychloro insecticides produce colorless solutions when treated in this manner.

Note 11: By subjecting it to oxidation with the per aceds, aldrin may be converted to dieldrin (6) and subsequently identified by this test.

14. SUMMARY

Rapid qualitative tests are described for the detection and identification of the more commonly used polychloro insecticides whether alone or in dust mixtures. Their simplicity and accuracy render these tests readily adaptable to routine use.

15. REFERENCES

(1) ARD, J. S., Anal. Chem., 20 858 (1948).
(2) DAVIDOW, B., This Journal, 33, 886 (1950).
(3) FAIRING, J. D., and WARRINGTON, H. P., Jr., Advances in Chemistry Series, No. 1, 260 (1950).
(4) JOHNSON, D. P., This Journal, 38, 153 (1955).
(5) HALLER, H. L., et al., J. Am. Chem. Soc., 67, 1591 (1945).
(6) LIDOV, R. E., BLUESTONE, H., & SOLOWAY, S. B., Advances in Chemistry Series, No. 1, 175 (1950).

CSMA 61-11

Infrared Determination of N,N-Diethyl-meta-Toluamide in Delphene and in Alcohol Solution

(Tentative)

Scope

The technical product "Delphene" contains about 85% meta isomer of di-

Table 1.—Outline of Qualitative Tests for Polychlorinated Insecticides*

Insecticide	*Method*	*Solvent*	*Reagents*	*Results (color)*	*Interferences*
Chlordane	I	n-Hexane	Ethylene glycol-pyridine	Wine-red	None
Methoxychlor	II	Ether	85% H_2SO_4	Red	None
Toxaphene	III	n-Hexane	Pyridine-methanolic KOH	Red	Strobane
DDD	IV (A)	n-Hexane	H_2SO_4-HNO_3	Red	Methoxychlor
	IV (B)	n-Hexane	H_2SO_4-acetic anhydride	Orange	None
DDT	V	CCl_4	H_2SO_4-HNO_3	Green	None
Heptachlor	VI (A)	Benzene	Pyridine-Aniline	Green	None
	VI (B)	Benzene	Methanolic KOH	Purple	None
Aldrin	VII (A)	Xylene	Fuming H_2SO_4	Red	Dieldrin, endrin
	VII (B)	Benzene-xylene	Fuming H_2SO_4	Red	None
Dieldrin	VII (A)	Xylene	Fuming H_2SO_4	Red	None
	VII (D)	Benzene	Ethanolic NaOH-sulfur	Pink	Endrin
Endrin	VII (A)	Xylene	Fuming H_2SO_4	Red	Aldrin, dieldrin
	VII (C)	n-Hexane	Conc. H_2SO_4 & HNO_3	Red & Green	None
	VII (D)	Benzene	Ethanolic NaOH-sulfur	Pink	Dieldrin

*It is advisable to use glass-stoppered test tubes for all the tests involving the use of acids.

ethyltoluamide, and other isomers. The analytical wavelengths are 14.15μ and 14.44μ. If alcohol is present, it must be removed prior to infrared analysis since it absorbs strongly in the 13μ to 15μ region.

Standard Solution

Weigh 0.4 gram pure diethyl-m-toluamide (obtainable from Pesticide Chemicals Research Branch, ARC, Beltsville, Md.) into a 10 ml volumetric flask and make to volume with carbon disulfide.

Determination

Weigh a sample containing about 0.4 gram diethyl-meta-toluamide into a 125 ml Erlenmeyer flask and evaporate the alcohol at about 50° under vacuum on a rotary evaporator. Do not heat longer than necessary. (The alcohol may also be removed by heating on the steam bath and passing a slow current of air into the flask for about 2 minutes.) Transfer the residue to a 10 ml volumetric flask and make to volume with carbon disulfide. Add anhydrous sodium sulfate and shake to remove any remaining water. The solution should be clear.

Transfer to a sodium chloride cell and scan the sample solution and the standard solution using the following settings for the Perkin-Elmer model 21 spectrophotometer:

Cell:	0.5 mm, compensated with CS_2
Range:	13μ - 15μ
Resolution:	960 (Program)
Speed:	2
Gain:	Adjusted

Measure the absorbance of the meta-isomer peak at 14.15μ and, with the base point at 14.44μ, calculate the percent of diethyl-m-toluamide.

References

(1) W. H. Clark, Anal. Chem. *31*, 197 (1959).

(2) Interim Federal Specification, Repellent, Insect, Diethyltoluamide, 4.4.1, (August 15, 1958).

CSMA 61-12

Method for the Determination of 2,4-Dichlorophenoxyacetic Acids; Salts, Esters and Amides of 2,4-Dichlorophenoxyacetic Acid and Esters of 2,4-Dichlorophenoxyacetic Acid in Formulations

(Tentative)

Scope

1. This method describes the procedures for the determination of 2,4-Dichlorophenoxyacetic acid, salts, esters and amides of 2,4-Dichlorophenoxyacetic acid esters of 2,4-Dichlorophenoxyacetic acid in the presence of soap, acids, alcohols and oils.

Procedure

2. METHOD I FOR THE DETERMINATION OF 2,4-DICHLOROPHENOXYACETIC ACID

(1) Transfer 1 g of the 2,4-D acid to a 250 ml Erlenmeyer flask. Dissolve in 75 ml neutral ethyl alcohol and titrate with 0.1 N sodium hydroxide, using thymolphthalein as an indicator. Calculate the percentage of 2,4-D on the basis that 1 ml of 1 N-NaOH is equivalent to 0.0221 g of acid.

(2) NOTE: If the sample contains insoluble carriers, transfer a sample equivalent to 1 g of 2,4-D acid to a 250 ml. beaker, add 25 ml of 1 N sodium hydroxide, and 50 ml of water. Stir to dissolve the 2,4-D. Filter and wash any insoluble material that may be present and transfer to a 250 ml separatory funnel. Proceed as directed in tentative method #21, par. 1, beginning "Neutralize with 10% sulfuric acid."

3. METHOD II FOR THE DETERMINATION OF SALTS OF 2,4-DICHLOROPHENOXYACETIC ACID

(1) Dissolve a sample equivalent to about 1 g of 2,4-D acid in 50 ml of water (filter and wash samples containing insoluble carriers), transfer to a 250 ml separatory funnel, neutralize with 10% sulfuric acid, and add 10 ml excess acid.

(2) Extract the aqueous phase twice with 75 ml portions of ether. Wash the combined ether extracts free from mineral acid with 10 ml portions of water until washings remain alkaline with the addition of one drop of 0.1 N sodium hydroxide and phenolphthalein.

(3) Transfer the ether solution to a 400 ml beaker, rinsing the separatory funnel with ether. Add 25 ml of water, a few boiling chips and evaporate the ether layer on a steam bath.

(4) Dissolve the aqueous mixture in 100 ml of neutral ethyl alcohol and titrate with 0.1 N sodium hydroxide, using thymol phthalein as an indicator.

(5) Each ml of 0.1 N sodium hydroxide is equivalent to 0.0221 g of dichlorophenoxy acetic acid.

4. METHOD III FOR THE DETERMINATION OF ESTERS AND AMIDES OF 2,4-DICHLOROPHENOXYACETIC ACID

Reflux a sample weight equivalent to 0.8 g of the ester or amide with about 1 g of potassium hydroxide and 90 ml of 95% ethyl alcohol for 1 hour in a 250 ml S/T Erlenmeyer flask. Transfer the contents of the flask to a 250 ml beaker, add 50 ml of water, and evaporate on the steam bath to about 50 ml to remove the alcohol. Cool the remaining aqueous solution, transfer to a 250 ml separatory funnel, and proceed as in tentative method #21, par. 1, beginning "Neutralize with 10% sulfuric acid."

5. METHOD IV FOR THE DETERMINATION OF ESTERS OF 2,4-DICHLOROPHENOXYACETIC ACID IN PRESENCE OF SOAP, ACIDS, ALCOHOLS, AND OILS

(1) Saponify a weight of sample equivalent to 0.7 g of the ester by the procedure in tentative method #22 and, after evaporating the alcohol on the steam bath, transfer the aqueous solution to a 250 ml separatory funnel, and extract with 75 ml of petroleum ether to remove unsaponifiable oils.

(2) Draw off the aqueous phase into a 200 ml volumetric flask, add a few drops of 1% phenolphthalein solution and a few drops of a 1 to 1 hydrochloric acid to the disappearance of the pink color, and then add 1 to 1 ammonium hydroxide solution until slightly alkaline. Add sufficient water to give a volume of about 150 ml. Add slowly sufficient 10% barium chloride solution to precipitate fatty acids, make to volume, shake, and filter. The solution must be alkaline after the addition of barium chloride; otherwise the 2,4-D will precipitate.

(3) Transfer a 100 ml aliquot in a 250 ml separatory funnel acidify with hydrochloric acid, and proceed as in tentative method #21, par. 2, beginning "Extract the aqueous phase twice."

6. METHOD V FOR THE DETERMINATION OF 2,4-DICLHORO-PHENOXYACETIC ACID IN PRESENCE OF OIL, SOAP, AND ALCOHOL

(1) Transfer a sample weight equivalent to 0.5 g of 2,4-D to a 250 ml separatory funnel and dilute with 75 ml of petroleum ether.

(2) Extract with six consecutive 10 ml portions of a 50% alcohol-water solutions, to each portion of which has been added a few drops of 40% potassium hydroxide solution and a few drops of phenolphthalein indicator. Draw off the combined alcohol-water extracts into a 250 ml breaker and place on a steam bath to remove the alcohol.

(3) Transfer the aqueous residue to a 200 ml volumetric flask and cool to slightly below room temperature. Proceed as in tentative method #23, par. 2, beginning "and a few drops of a 1 to 1 hydrochloric acid to the disappearance of the pink color."

7. METHOD VI FOR THE DETERMINATION OF 2,4-DICHLOROPHENOXYACETIC ACID IN ALCOHOL OF GLYCOL CARRIERS

Dilute a sample weight equivalent to 0.8 to 1.0 g of 2,4-D to 75 ml with neutral 95% ethyl alcohol and titrate directly with 0.1 N sodium hydroxide solution.

CSMA 61-13

Infrared Spectrophotometric Method for Aldrin, Dieldrin and Endrin

(Tentative)

Scope

1. This method describes an infrared method for Aldrin, Dieldrin and Endrin.

Dieldrin and endrin in dusts, granules, wettable powders, emulsifiable concentrates, and solns are purified on adsorbent columns. Hexachloro-epoxy-octahydro-endo, exo-dimethanonaphthalene (HEOD) content of the purified dieldrin or tech. dieldrin directly is detd by infrared absorbance, using baseline technique, and dieldrin is calcd assuming 85% HEOD content. Endrin content of purified endrin or tech. endrin directly is detd as hexachloro-epoxy-octahydro-endo, endo-dimethanonaphthalene similarly.

Aldrin is extracted from dusts, wettable powders, and inorg. fertilizers using an adsorbent column. Hexachloro-hexahydro-endo, exo-dimethanonaphthalene (HHDN) content of the extract or tech. aldrin directly is detd by infrared

absorbance, using baseline technic, and aldrin is calcd assuming 95% HHDN content. Method is not applicable to emulsifiable concentrates or granules containing petroleum hydrocarbon solvents or to mixts contg other common pesticides or adjuvants that exhibit infrared absorption at the wavelength region used for analysis of HHDN.

Procedure

2 CSMA 61-13 is identical with the Method of Analysis for Aldrin, Dieldrin, and Endrin adopted as First Action by the Association of Agricultural Chemists, October, 1960.

CSMA 61-14
Determination of Dieldrin In Formulations By Partition Chromatography
(Tentative)

Scope

1. This method describes the procedure for the determination of Dieldrin in formulations by partition chromatography. The reagents and apparatus are the same as required for determination of Gamma BHC by partition chromatography. Methods of Analysis, A.O.A.C., 8th Edition, p. 81, par. 5. 134 (1955).

Reagents

2. Silicic acid, Mallinckrodt's chromatographic grade
Ethyl ether
N-Hexane, technical, redistilled
Nitromethane, redistilled
Petroleum ether (Skellysolve F)
Mobile solvent: n-hexane saturated with nitromethane
Mixed dye solution: Dissolve 25 mg each of D and C Violet No. 2 and D and C red No. 18 in 50 ml of mobile solvent. Store in a glass stoppered bottle.

Apparatus

3. Waring Blendor with 1 quart mixing cup
Erlenmeyer flasks, 125 ml—several dozen
Graduated cylinder, two 10 ml or a two compartment fraction collector having a capacity of 10 ml in each arm
Volumetric flasks, several 50 ml glass stoppered
Pipets, several 10 ml. volumetric
Chromatographic tube, Scientific Glass Apparatus Co., J-1660-4 except that it should be constructed of heavy walled Pyrex tubing, approximately 3½ mm. wall thickness
Vacuum pump, such as Cenco Pressovac 4
Pressure gauge which registers up to 15 lbs. pressure
Pressure pump or Compressed air line, if not available use tank of nitrogen.
Hot water bath for evaporating solvent
Soxhlet or Goldfisch extractors

Procedure

Preparation of Sample:

4. Weigh a sample of dust containing 1.00 g of dieldrin and extract on Soxhlet or Goldfisch for 6 hours or overnight. If DDT is present the sample should be limited to contain 1 g or less of DDT. Evaporate the extract until the ether odor is not detected. Add 25 ml. mobile solvent and on dusts containing sulfur heat just to boiling. Allow to cool to room temperature. Decant through pea-sized wad of cotton into a 50 ml. volumetric flask containing 1 ml. of the mixed dye solution. Make a second hot extraction on the sulfur bearing dusts. On other dusts transfer residue from ether extract to 50 ml. volumetric with mobile solvent. Add 1 cc of mixed dye and make to volume.

5. For 16% dieldrin solutions weigh a 4 g. sample into a 50 ml. volumetric flask; add 1 ml. of mixed dye; and make to volume with mobile solvent. Some samples contain materials which go through the column and prevent good separation of fractions. If this happens weigh the required amount of sample into a 125 ml. Erlenmeyer flask. Add a few boiling stones and 10 ml to 20 ml of petroleum ether F. Attach to suction manifold and place in warm water bath. Too much suction will cause a sudden boiling and loss of sample. Leave on suction in bath until volume no longer decreases. Repeat this several times, if possible until a solid residue is obtained. Take this residue up with mobile solvent and prepare sample as usual.

Preparation of the Column:

6. For all samples except dieldrin in oil solutions use 75 g. (± 0.5 g.) of silicic acid, about 42 ml. of nitromethane and 225 ml. of mobile solvent. As each batch of silicic acid is different, the amount of nitromethane required must be determined by trial. For dieldrin in oil samples use 100 g. of silicic acid, about 55 ml. of nitromethane and 300 ml. of mobile solvent. Transfer to a Waring Blendor and mix for 15 seconds then pour mixture quickly into the chromatographic tube. A 3 ft. glass stirring rod worked around in the tube will remove trapped air bubbles. Apply pressure to the column until the silicic acid ceases to settle. Release the pressure and remove all except 1 inch of the upper solvent layer using steady suction and a trap to catch the solvent. Again apply pressure, up to 8 pounds, to the column until about ⅛ inch of mobile solvent remains above the silicic acid. (The silicic acid should remain covered with mobile solvent: if the top of the column becomes dry, channelng may occur.)

Operation of the Column:

7. Pipet 10 ml. of the prepared sample solution and allow to flow slowly down the side of the tube. Force solution into the silicic acid. Wash wall 2 times with 1-2 ml. portions of mobile solvent pressing each washing into the column then gently fill the tube up to within 1 inch of the top with mobile solvent. Apply pressure to give a flow to 3 to 4 ml. per minute.

Collection of the fractions:

8. For samples containing DDT in addition to dieldrin, collect the fractions from just before the red band reaches the fritted disc through all the red portion. This contains the DDT. Between the red band and the violet band is the hexachloro-epoxy-octahydro dimethanonaphthalene (HEOD). Start taking fractions for this when all of the red dye is out of the column, taking 5 ml. fractions until the HEOD appears. Evaporate these fractions carefully as the material tends to splatter. Splattering may be eliminated by using a steam bath and no suction instead of a water bath at 65° and reduced pressure. Combine fractions in a weighed flask; evaporate on water bath at 60-65°C using reduced pressure cautiously; and finally evaporate at room temperature with a high vacuum pump. Calculate the percentage of hexachloro-epoxy-octahydro dimethanonaphthalene in the sample.

References

(1) Determination of Dieldrin in Formulations by Partition Chromatography by J. B. McDevitt, Jr., Louisiana Agricultural Experiment Station, Baton Rouge, Louisiana.

(2) Methods Clearing House Method 812.6.

CSMA 61-15
Determination of DDT
(Official)

Scope

1. This method is applicable to solutions of DDT in petroleum hydrocarbons. It has not yet been applied to aqueous emulsions of DDT.

The reaction of DDT with sodium metal in isopropyl alcohol results in the conversion of all chlorine atoms in the DDT molecule to sodium chloride. The sodium chloride thus formed is determined volumetrically by the modified Volhard method.

Reagents

2. (1) Benzene, industrial grade, should be chlorine free.

(2) Sodium metal—cut in small pieces approximately ⅛" x ⅛" x 1/16" and store under kerosene.

(3) Isopropyl Alcohol—Should be 99% or better.
50% Isopropanol — Mix equal volumes of 99% isopropanol and distilled water.

(5) Dilute HNO_3 — Mix equal volumes of 70% nitric acid and distilled water.

(6) Silver Nitrate Solution, 0.1 N, accurately standardized.

(7) Potassium Thiocyanate Solution, 0.1 *N*, accurately standardized.

(8) Ferric Alum Indicator — Dissolve 400 g. of ferric ammonium sulfate, $Fe_2(SO_4)_3 \cdot (NH_4)_2SO_4 \cdot 2H_2O$, in - liter of water with the aid of heat.. Heat to boiling and

add 70% HNO_3 slowly while boiling until red color is removed. Usually 25 to 50 ml. of acid is required. Filter and store in a glass bottle.

Procedure

3. Weight into a 100-ml. volumetric flask a sample containing 1.2 to 1.5 grams of DDT and make to volume with benzene. Pipette a 10-ml. aliquot of this solution into a 250-ml. Erlenmeyer flask having a standard taper ground-glass joint. This aliquot portion must represent exactly one-tenth of the total volume. If doubt exists as to the accuracy of the pipet, use a buret. Evaporate most of the benzene on a steam bath with the assistance of a jet of air, but avoid prolonged heating of the dry sample; it is not necessary that all traces of benzene be removed. Add 25 ml. of 99% isopropyl alcohol to the flask and introduce 2.5 grams of sodium metal cut in small pieces; it is necessary to remove most of the adhering oil in which the sodium is stored by blotting with filter paper before weighing out the sodium. Attach the flask to an Allihn type reflux condenser, and reflux vigorously on a hot plate for 15 minutes. Meanwhile, measure 10 ml. of 50% aqueous isopropyl alcohol into a 50-ml. dropping funnel and insert the stem of the funnel into the top of the condenser. At the end of the period of reflux, carefully adjust the dropping funnel so that the aqueous alcohol runs into the flask at the rate of 1-2 drops per second, *not faster.* To preclude the possibility of accident in case the alcohol should be added too rapidly, it is well to place a safety screen between the flask and the operator at this point. Boil for an additional 10 minutes after all the 50% isopropanol has been added. Finally, add 60 ml. of distilled water, remove from the hot plate and cool.

4. Acidify the solution with 20 ml. of 1:1 HNO_3. Add 25 ml. of 0.1 *N* $AgNO_3$ with a burette or transfer pipette. Also, add 3 ml. of nitrobenzene and 3 ml. of ferric alum indicator, and swirl the contents of the flask to coagulate the AgCl precipitate. Titrate the excess $AgNO_3$ with 0.1 *N* KCNS solution. The orange-brown end point should persist after shaking for 1 minute.

Calculate the results as follows:

$$\frac{(\text{ml. } AgNO_3 \times N \text{ } AgNO_3 - \text{ml. KCNS} \times N \text{ KCNS}) \times 35.457}{\text{Grams of Sample}} = \% \text{ Chlorine}$$

% Chlorine x 2 = % DDT

Duplicate values should agree within 0.2%.

Note: If there is any question regarding the purity of the reagents, a blank determination should be run and a correction applied accordingly.

Reference

Method for the Determination of Total Chlorine in DDT, 800-805, U. S. Dept. of Agr., Production and Marketing Administration, October 15, 1945.

Umhoefer, Ind. and Eng. Chem., Anal. Ed., *15*, 383 (1943).

Caldwell and Moyer, Ind. and Eng. Chem., Anal. Ed., *1*, 48 (1936)

Butts and McLaughlin, Hercules Experiment Station, RI 4475, April 12, 1946.

CSMA 61-16
Infrared Determination of DDT in Dusts
(Tentative)

Scope

1. This method describes a procedure for the Infrared Determination of DDT in Dusts.

Standard Solution

2. Weigh 0.250 gram Technical DDT into a 50 ml volumetric flask (or other glass-stoppered container) and add exactly 25 ml carbon disulfide. If the sample to be analyzed contains sulfur, add the weight of sulfur expected in the portion of sample to be taken for analysis. Shake to dissolve and add a small quantity of anhydrous sodium sulfate. Centrifuge a portion of the solution if it is not clear.

Procedure

3. Weigh a sample containing about 0.25 gram DDT into a 50 ml volumetric flask and add exactly 25 ml carbon disulfide and a small quantity of anhydrous sodium sulfate. Let stand for at least 30 minutes with occasional shaking. Transfer a portion to a glass-stoppered test tube and centrifuge for a short time. Transfer to a sodium chloride cell and scan with a Perkin-Elmer model 21 spectrophotometer using the following settings and conditions. Scan the standard solution in the same manner:

Cell:	0.5 mm
No compensation; balance the instrument without the cells in place.	
Range:	8.5μ to 10.5μ
Resolution:	960 (program)
Speed:	4
Filter:	Out
Gain:	Adjusted

Repeat the scan if it is desired to check the reproducibility of the instrument.

Measure the absorbance of the DDT peak at 9.83μ with baseline from 9.4μ to 10.2μ, and calculate the percentage of DDT.

Note:

4. Other infrared spectrophotometers may be used with appropriate settings.

References

H. C. Austin, F. L. Bonner, E. A. Epps, J. Official Agr. Chemists, *10*, 286, No. 1 (1957).

CSMA 61-17
Method for the Determination of the Setting Point of DDT
(Tentative)

Scope

1. This method describes a procedure for the determination of the setting point of DDT.

Procedure

2. Fit a heavy wall, rimless 25 by 200 mm test tube of heat resistant glass into a 4-oz. jar of such shape as to provide an air jacket about 1 cm thick around the portion of the test tube that will contain the melted sample. Hold the test tube in place in the jar with a loosely fitting stopper.

Remove the test tube from the stopper, transfer into it 30 ± 0.1 gm of sample. Support the tube and its contents in an oil bath maintained at 115°-120°C. When the DDT has almost all become molten, insert in the tube a glass ring stirrer and an accurate thermometer graduated in fifths of a degree (A.S.T.M. standard thermometer 70-160°C—Fisher Scientific Co. No. 15-168-R-3 or equivalent). Stir until the DDT is completely melted and has reached a temperature of 115°-120°C.

Remove the test tube from the bath, wipe free of oil, and place in the stoppered jar. Clamp the thermometer in place so that the bulb is about 1 cm above the bottom of the test tube so that it will maintain good contact at all times with the sample. Stir the liquified sample continuously, using the glass ring stirrer until the stirrer freezes in it. All stirring shall be at the approximate rate of 100 strokes per minute (1 up and 1 down = 1 stroke, all strokes to be 3-4 cm in length). When the temperature drops to 88° a small amount of the sample of DDT being tested may be added as seed crystals if none have already formed in the test tube.

Observe the temperature of the melt as soon as crystallization begins. The low point is the temperature at which which the rate of evolution of heat of crystallization exceeds the rate of heat loss of the system and causes the temperature to begin to rise. The setting point is taken as the maximum temperature reached during this rise.

Notes: The 4-oz. jar specified may be any convenient sample or food jar.

References

Joint Army-Navy Specification J A N—D—56 A Soap— May 1945—The Setting Point of DDT by Elmer E. Fleck and Robert K. Prestin, Bureau of Entomology and Plant Quarantine, U.S.D.A.

CSMA 61-18
Method for the Determination of DDT in Formulations
(Tentative)

Scope

1. The insecticide solution covered by this specification is designed as an oil-base residual insecticide to provide continuing protection against flies, mosquitoes, bedbugs, and other flying and crawling insects.

Applicable Specifications and Other Publications

2. The following Federal Specifications, form a part of this specification:

O-D-370—Dichlorodiphenyltrichlorchloroethane (DDT).

VV-K-211—Kerosene.

VV-L-791—Lubricants, Liquid Fuels, and Related Products; Methods of Inspection, Sampling, and Testing.

3. *Composition.*— The insecticide shall comprise the following ingredient materials in the specified proportions by weight:

	Percent
Dichlorodiphenyltrichloroethane (DDT)	5 ± 0.1
Kerosene	80 ± 0.2
Auxiliary solvent	15 ± 0.2

Dichlorodiphenyltrichloroethane (DDT).—DDT shall conform in all respects to grade B of Federal Specification O-D-370. The finished spray shall contain 25 mg. ± 0.5 mg. of chlorine per gram of solution.

Kerosene.— Kerosene shall conform to the requirements of Federal Specification VV-K-211, and shall contain no organic chlorine when tested as specified in 4(A).

Auxiliary solvent.—Auxiliary solvent shall contain no organic chlorine when tested as specified in 4(A) and shall consist principally of aromatic hydrocarbons having the following properties:

Flash point (Cleveland open cup), minimum, °F.	150
Distillation range:	
Initial boiling point, minimum, °F.	300
End point, maximum, °F.	650
Color, Union Colorimeter, maximum	4.0
Degrees A.P.I. at 60°F.	9-22
Solubility of DDT (melting point 108-9°C.) at 30°C., minimum, percent by weight	35

Auxiliary solvents shall not add an objectionable odor to the finished spray.

Staining properties.—There shall be no residual stain when the auxiliary solvent is tested as described in 4(E).

Stability.—The finished insecticide shall show no sedimentation, when tested as specified in 4(C).

Color of finished insecticide.—The color of the finished insecticide shall not exceed Union Colorimeter color No. 2.0 when tested as specified in 4(D).

(A) *Chlorine content.*—Transfer a quantity of sample containing 0.065-0.075 gm. of DDT to a 250-500 ml. standard tapered Erlenmeyer flask. Add 25 ml. of 99 percent isopropanol. Add 2.5 gm. of metallic sodium in the form of ribbon or cut in small pieces, and shake the flask to mix the sample with the alcohol. Connect to a reflux condenser and boil gently for at least ½ hour Shake the flask occasionally. Eliminate all excess metallic sodium by cautiously adding about 10 ml. of 50 percent isopropanol through the condenser at the rate of 1-2 drops per second. Boil for an additional 10 minutes, add 60 ml. of water, and then add 5 ml. of 30 percent hydrogen peroxide through the top of the condenser. Heat the solution to boiling and boil 15 minutes. Add 5 ml. more of hydrogen peroxide and again boil 15 minutes. Disconnect the flask from the condenser and boil for 15-30 minutes to remove alcohol. Cool, add 2-3 drops of phenolophthalein solution, neutralize by adding nitric acid (1-1), and then add 10 ml. in excess. Add 15 ml. of N/10 silver nitrate and coagulate the precipitated silver chloride by digesting on a steam bath for ½ hour with frequent stirring. Cool, filter through a fast qualitative paper, and wash thoroughly with distilled water. Add 5 ml. of saturated ferric alum solution, and determine the excess silver nitrate in the filtrate by titration with N/10 potassium thiocyanate. Subtract the quantity of silver nitrate found in the filtrate from that originally added. The difference will be that required to combine with the chlorine in the DDT. One ml. of N/10 silver nitrate is equivalent to 3.5457 mg. of chlorine.

Calculate results:

$$\text{mg. chlorine per gram sample} = \frac{\text{ml. } N/10\ AgNO_3 \text{ used} \times 3.5457}{\text{Weight of sample in grams}}$$

(B) *Auxiliary solvent.*—Tests on auxiliary solvent shall be made in accordance with the following methods specified in Federal Specification VV-L-791:

Tests	Method No.
Flash point (Cleveland open cup)	110.3
Distillation range:	
Initial boiling point	100.1
End point	100.1
Color, Union Colorimeter	10.2
Degrees A.P.I.	40.1

(C) *Stability.* — One hundred grams of the finished insecticide shall be measured into a 250-ml. Erlenmeyer flask and stored in a refrigerator maintained at —10 ±0.5° F. for a period of 10 days. The mixture shall be seeded with a small crystal of DDT on the fifth day.

(D) *Color of finished insecticide.* —The color shall be determined in accordance with method 10.2 of Federal Specification VV-L-791.

(E) *Staining properties.* — Immerse a 6-inch square of bleached cotton sheeting in the finished insecticide. Thoroughly wet the sheeting, wring to remove excess liquid, and hang up to dry for 48 hours in a well ventilated room. At the end of 48 hours, the treated section of sheeting shall be examined and compared to a similar untreated piece of sheeting for staining.

CSMA 61-19
Determination of Dimethyl Dichlorovinyl Phosphate Insecticide in Solid and Liquid Formulations—Infrared Spectrophotometric Method
(Tentative)

Scope

1. This method describes a procedure for the determination of Dimethyl Dichlorovinyl Phosphate Insecticide in solid and liquid formulations. The Insecticide is a pesticidally-active material containing not less than 93% dimethyl dichlorovinyl phosphate (DMDCVP). Slight to moderate interferences are encountered with a few aliphatic and aromatic type solvents in liquid formulations but, in cases where the type and amount of solvent are known, it is possible to correct for this solvent interference.

Dimethyl phosphoric acid, a hydrolysis product of DMDCVP will interfere with the method when present in concentrations greater than about 10%.

Method Summary

2. (a) Dust and granular formulations are extracted with chloroform, the extract is evaporated to a volume of 70-80 ml and transferred to a 100-ml volumetric flask. The DMDCVP content is determined by measurement of the infrared absorbance of 10.2 microns using an infrared spectrophotometer.

(b) Emulsible concentrates and solutions of DMDCVP Insecticide are weighed into 10-ml volumetric flasks in amounts sufficient to give 0.08 to 0.12 grams of DMDCVP and diluted with chloroform. Table I lists the solvents and formulation constitutents which have been tested for interference at the analytical wavelength.

TABLE I

Solvent or Formulation Constituent	*Interference*[a]
Acetone	None
Acroclor 5460	None
Benzene	None
Carbon disulfide	None
Chloroform	None
Cyclo-Sol 53	Slight
Dimethyl formamide	None
Heavy Aromatic Naphtha (HAN)	Slight[b]
Methylene chloride	None
Mobilsol F	None
Mineral Seal Oil	None
Mineral spirits	Slight
Perchloroethylene	None
Saf-T-Sol 105	Slight
Shell Dieseline	Slight
Shell Kerosine 640	None
Shell Sol B	None
Shell Sol 71	Slight
Shell Sol 72	None
Skellysolve B	None
Sucrose	None
Toluene	None
Trichloroethylene	None
Xylene	Slight

[a]None — < ± 1% amount of DMDCVP Insecticide present.
Slight — < ± 10% of amount of DMDCVP Insecticide present.
Moderate — > ± 10% of amount of DMD CVP Insecticide present.
[b]Moderate when HAN comprises more than 70% of formulation.

(c) The infrared analysis is accomplished by measuring the absorbance at a reference point (10.0 microns) and subtracting this absorbance from the measured absorbance at the analytical wavelength (10.2 microns). This net absorbance is used to obtain the concentra-

tion of DMDCVP from previously prepared calibration curves relating net absorbance to concentration of DMDCVP in grams per liter. (Note 1)

Apparatus

3. (a) *Infrared spectrophotometer,* capable of recording in the region of 2-15 microns. The slit width must be adjustable to give a satisfactory signal-to-noise ratio and adequate resolution. In general, the minimum slit width giving a signal-to-noise ratio of about 100 to 1 is chosen. A sealed liquid absorption cell with sodium chloride windows having a path length of 0.2 mm is required.

(b) *Hypodermic Syringe,* Luer type, glass, 1.0-ml capacity. Use an 18-gauge (Stubbs), 2 inch, slip on type needle.

(c) *Extraction Column,* 25 x 400 mm.

(d) *Flasks,* Volumetric, 10-ml, 100-ml, and 250-ml capacity.

(e) *Evaporating Dishes,* Pyrex, 125 mm.

Materials

4. (a) *DMDCVP Insecticide,* Use a standard sample whose purity is known[1].

(b) Chloroform, ACS Analytical Reagent Grade.

(c) Absorbent Clay, use a diatomaceous earth such as Hy-Flo Super Cel[2].

Apparatus Calibration

5. (a) Into each of several 10-ml volumetric flasks, weigh, to the nearest 0.1 mg, 25, 50, 75, 100, 125, 150, 175, and 200 mg quantities of standard DMDCVP. When diluted to the mark with chloroform, these calibration solutions will contain concentrations of DMDCVP on the order of 2.5, 5, 7.5, 10, 12.5, 15.0, 17.5, and 20.0 grams of DMDCVP per liter of solution.

Note 1: The infrared spectrophotometric method presented here assumes an adequate knowledge of the technics and calculations used in infrared spectroscopy; practical considerations do not permit a comprehensive presentation of all phases of the operation of such instruments and the calculation of results obtained therefrom. The method, as outlined, is for use with a recording spectrophotometer; however, the method is suitable for use with any infrared spectrophotometer capable of measuring absorbance at the wavelengths specified.

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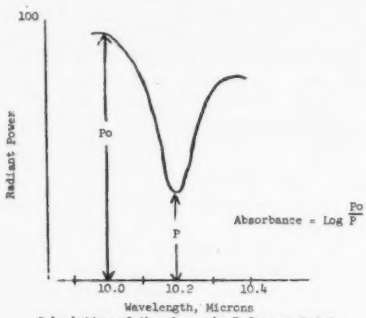
[1] A standard sample of insecticide of known purity suitable for use as a photometric standard known as "Vapona," is available upon request from Shell Chemical Company, Agricultural Chemicals Division, Technical Service Department, 110 West 51st Street, New York 20, New York.

[2] Manufactured by Johns-Manville Company, 22 East 40th Street, New York 16, New York.

60-19 — Fig. 1



Calculation of Absorbance by Reference Point Modification of Baseline Density Technique

(b) Fill the sealed liquid absorption cell, having a cell path length of 0.2 mm with choroform. Adjust the spectrophotometer to the optimum settings with respect to gain, slit width, response, chart speed and wavelength scanning speed and obtain triplicate scans of the chloroform and cell over the 10.4-9.9 micron wavelength range.

(c) Without changing the instrument settings, fill the cell, in turn, with each of the calibration solutions prepared in (a) starting with the most dilute. Make triplicate scans of each of these solutions over the 10.4-9.9 micron wavelength region.

(d) For each of the scans of the calibration solutions construct a baseline through the reference point on the curve at 10.0 microns parallel to the zero radiation line. Draw a perpendicular to the zero radiation line through the absorbance peak of the calibration solution at 10.2 microns and measure the radiant power Po and P as shown in Figure 1; the distances may be measured in any convenient units, but always in the same units. Calculate absorbance as the logrithm of the ratio of the incident power (Po) to the transmitted radiant power (P).

(e) Subtract the mean absorbance of the cell plus chloroform obtained in (b) from the mean absorbances of the cell plus calibration solutions obtained in (c). Make a plot of the net absorbances due to DMDCVP as ordinate against the corresponding concentrations of DMDCVP in grams per liter as abscissa.

Sample Preparation

6. (a) *Solid formulations*

(1) Prepare an extraction column by adding sufficient adsorbent clay (Hy-Flo Super Cel) to make a layer 2 inches high when gently packed. Place a 250-ml volumetric flask under the column outlet. Accurately weigh sufficient sample to contain between 0.8 and 1.2 grams of DMDCVP. Transfer the sample to the extraction column using chloroform to accomplish the transfer and subsequent rinsing of the sample container.

(2) Working in a well-ventilated hood, add a 50-ml portion of chloroform to the column. Using a stirring device, vigorously agitate the sample and the top half of the adsorbent clay layer, forming a slurry with the solvent. Withdraw the stirring device and rinse it and the column walls with additional chloroform from a wash bottle.

(3) Allow 150-ml- of additional extraction solvent to percolate through the column. Dry air or nitrogen at 2.5 psi, pressure may be used to speed the extraction if it is proceeding too slowly. When the height of the solvent above the adsorbent clay-sample layer has diminished to 2-3 mm, rinse the column with 3 successive 10-ml portions of chloroform allowing each portion to enter the clay layer before adding the next. Allow the extraction column to drain or blow dry and rinse the top of the column outlet with chloroform catching the rinse in the 250-ml volumetric flask.

(4) Transfer the contents of the flask to an evaporating dish (125 mm in diameter) with a mark showing the level of 80 ml volume. Place evaporating dish and contents on a steam bath and evaporate to the 80-ml volume mark on the evaporating dish. Using chloroform, quantitatively transfer the solution of extracted DMDCVP to a 100-ml volumetric flask. Determine the DMDCVP content by the infrared procedure in Section 7. (Note 2)

(b) *Liquid Formulations*

Weigh to the nearest 0.1 mg, an amount of the liquid formulation sufficient to give 1%w of DMDCVP in the volumetric flask (0.1 g in 10-ml, 0.25 g in 25-ml etc.) and dilute with chloroform. Determine the DMDCVP content by the infrared procedure in Section 7.

Procedure

7. (a) Dilute the chloroform solution of extracted DMDCVP or DMDCVP liquid formulation to the mark, mix thoroughly and fill the sealed liquid adsorption cell used in the calibration

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Note 2: When analyzing very dilute solid formulations, which would require the use of large samples (greater than 100 grams), or when the initial sample is limited, the following procedure should be used. Weight sufficient sample to contain about 0.1 of DMDCVP and extract as in Section 6 (a) (1) through (3) collecting the extract in a 500-ml Ehrlenmeyer flask equipped with a standard taper joint. Evaporate the solvent to a volumn of about 5-ml through an efficient distillation column such as a 3-ball Snyder column. Quantitatively transfer the contents of the Ehrlenmeyer flask to a 10-ml volumetric flask using a minimum of chloroform. Determine the DMDCVP content by the infrared procedure in Section 7.

with the sample solution. Using the same instrument settings that were used for the calibration, obtain duplicate scans of the sample solution over the 10.4-9.9 micron.

(b) Calculate the absorbance for each of the scans of the sample solution as described in Section 5 (d) and compute the mean absorbance due to the DMDCVP in the sample.

Decontamination

8. Following each use, thoroughly flush the liquid adsorption cell with chloroform. Soap all other contaminated apparatus in a 1N sodium hydroxide solution for 2 to 3 hours. Then wash with hot aqueous solution containing a detergent and rinse with copious amounts of water. Decontaminate the chloroform solutions with 1N alcoholic sodium hydroxide solution before discarding.

Calculation

9. (a) From the computed mean absorbance in Section 7 (b) read the concentration of dimethyl dichlorovinyl phosphate (DMDCVP) from the calibration curve relating absorbance to concentration of DMDCVP in grains per liter of solution.

(b) Calculate the DMDCVP content by the following equation:

$$\text{DMDCVP, \%w} = \frac{A \times V}{W \times 10}$$

where: A = Concentration of DMDCVP in grams per liter of sample solution.
V = Volume of sample solution in ml.
W = Weight of sample in grams.

(see Note 3)

(c) Calculate the DMDCVP Insecticide content by means of the following equation:

$$\text{DMDCVP Insecticide, \%w} = \frac{\text{DMDCVP, \%w}}{.93}$$

Precision

10. The following data should be used for judging the acceptability of results (95% propability) according to the statistical concept of precision.

(a) Duplicate results by the same operator should be considered suspect if they differ by more than the following amounts:

Repeatability
2% of mean

(b) Sufficient data are not available for making an estimate of the reproducibility of the method.

Note 3: In the analysis of liquid formulations, slight interferences may be noted. When the composition of the formulation is known, these interferences should be determined and appropriate corrections made to the above calculation.

NOTES ON THE USE OF CSMA METHOD 61-19

Water Soluble Formulation

DMDCVP insecticide formulations containing materials such as corn syrup as the principal ingredient have been prepared for infrared analysis by diluting the sample with an equal volume of water and extracting the water solution with chloroform. For example: 100 grams of a 0.2%w DMDCVP Insecticide in corn syrup is diluted with 100 ml of water and the solution extracted with five 50-ml portions of chloroform. The combined chloroform extracts are then washed with two 25-ml portions of water, dried with anhydrous sodium sulfate, and evaporated to about 10 ml through an efficient distillation column such as a 3-ball Snyder column. The residue is then transferred to a 25-ml volumetric flask with chloroform and analyzed by the infrared method (Test Method CSMA 61-19).

Aliphatic Hydrocarbon Formulations

A number of common aliphatic hydrocarbon solvents used to formulate DMDCVP Insecticide interfere with the infrared analysis; particularly in dilute, 1% or less, formulations. In some cases these interferences can be eliminated by extracting the formulation with acetonitrile. The acetonitrile extract can then be concentrated by evaporation through an efficient distillation column such as a 3-ball Snyder column and analyzed by an infrared method. It will be necessary to calibrate the spectrophotometer using acetonitrile in place of chloroform as shown in Test Method CSMA 61-19. The analytical wavelength is 10.2 microns as before, however, a reference point of 10.5 microns instead of 10.0 microns must be used.

Limited experience with this extraction has shown good recoveries of DMDCVP Insecticide from such solvents as Shell Sol 71, mineral oil, etc. It is not applicable to samples which are miscible with acetonitrile.

Aerosol Formulations

No good clean-up procedure has as yet been developed for samples of unknown composition. Samples of known composition can be analyzed by CSMA 61-19 after the following sampling procedure. Aerosols are sampled by cooling the container in a solid carbon dioxide-acetone bath, puncturing the container and allowing it to warm to room temperature. This removes the most volatile propellant.

CSMA 61-20
Determination of Methyl Parathion in Formulations and Technical Product—Infrared Spectrophotometric Method
(Tentative)

Scope

1. (a) This method describes a procedure for the analysis of methyl parathion, an insecticidally active material consisting of O,O-dimethyl O-*p*-nitrophenylthiophosphate. It is applicable to the analysis of pesticidal formulations such as dusts, dust concentrates, wettable powders, granules, emulsible concentrates, and other liquid formulations. The method can also be used for the analysis of technical methyl parathion. (Note 1).

(b) The presence of other insecticides such as the chlorinated hydrocarbons does not interfere.

Method Summary

2. (a) Liquid formulations or technical methyl parathion are dissolved directly in carbon disulfide.

(b) Solid formulations are extracted in a chromatographic column to separate the toxicant from the carrier material.

(c) The infrared analysis is based on the absorption of O,O-dimethyl O-*p*-nitrophenyl thiophosphate at 8.16μ as determined from the spectrum of the sample in carbon disulfide scanned in the wave length region of 7.81 to 9.40μ. The ratios of incident radiant power to transmitted radiant power, as determined by the baseline technic, are calculated from the recording.

(d) The absorbance calculated from the above ratios is then compared with previously prepared calibration curves relating absorbance to various amounts of methyl parathion.

Warning

3. When testing a highly toxic pesticide such as methyl parathion, take proper precautions to prevent skin contact and inhalation of the dusts and vapors. Whenever possible, work under a hood. Take care to prevent splashing of liquids, billowing of dust, and spillage. Always wear rubber gloves and have adequate face protection; decontaminate all apparatus and test solutions after use by the procedure given in Section 11.

Apparatus

4. (a) *Infrared Spectrophotometer,* capable of recording in the wave length region of 7 to 10μ. The slit width and gain must be adjustable to give a satisfactory signal-to-noise ratio and adequate resolution. In general, the minimum slit width giving a signal-to-noise ratio of about 100 to 1 is chosen. A sealed absorption cell, with sodium chloride windows, having an optical path length of about 0.2 mm, is required (Notes 2 and 3)

Note 1. A chemical method for the determination of methyl parathion in similar materials is described in CSMA 60-21.

Note 2. The infrared spectrophotometric method presented here assumes an adequate knowledge of the technics and calculations used in infrared spectroscopy; practical considerations do not permit a comprehensive presentation of all phases of the operation of such instruments and the calculation of results obtained therefrom. The method as out-

(b) *Hypodermic Syringe,* Luer-Type, glass, 1.0-ml capacity. Use an 18-gage (Stubbs) 2-inch, slip-on needle.

(c) *Chromatographic Column,* constructed as shown in Fig. 1.

Materials

5. (a) *O,O-Dimethyl O-p-Nitrophenyl Thiophosphate* (methyl parathion), recrystallized. Use a standard sample of methyl parathion the purity of which is greater than 99%[1].

(b) *Absorbent Clay;* use a diatomaceous earth such as Hy-Flo Super Cel[2].

(c) *Carbon Disulfide,* ACS Analytical Reagent grade.

(d) *Extraction Solvent.* A solution of carbon disulfide containing 5%v acetone (conforming to ASTM Specification D 329).

Apparatus Calibration

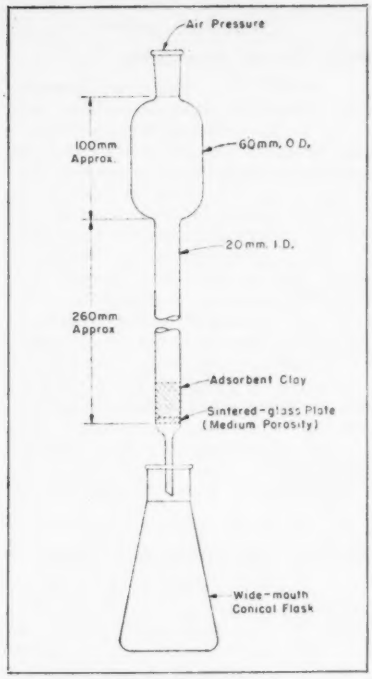
6. (a) Into each of several 10-ml volumetric flasks, weigh, to the nearest 0.1 mg, 20, 50, 80, 100, 120, and 150 mg of the standard sample of methyl parathion[1]. Dissolve in carbon disulfide, dilute to the mark, and mix thoroughly. The concentrations of these solutions will therefore be 0.2, 0.5, 0.8, 1.0, 1.2, and 1.5 g/100 ml.

(b) Fill the 0.2-mm cell with the most dilute of the standard methyl parathion solutions by means of the hypodermic syringe. Adjust the spectrophotometer to the optimum instrument settings with respect to gain, slit width, response, speed, and drum drive. Make duplicate scans of the carbon disulfide solution over the wave length region 7.81 to 8.40μ.

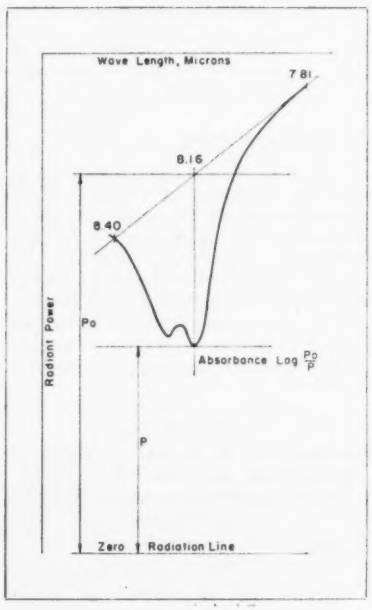
(c) Fill the cell with each of the five remaining solutions of methyl parathion in turn. Make duplicate scans of each of these solutions over the wave length region 7.2μ to 8.40μ, using the same instrument settings as in Paragraph (b).

(d) For each of the scans of the six calibration solutions, draw in the base line from the point on the curve at 8.40μ and tangent to the base of the absorbance peak in the region of 7.81μ. Draw a perpendicular line from the zero radiation line through the absorbance peak (see Fig. 2), and measure the incident radiant power from the zero radiation line to the base line (P_o) and the transmitted radiant power from the zero radiation line to the absorption peak (P). This distance may be measured in any convenient unit, but always in the same units. The absorbance is the logarithm of the ratio of the incident radiant power (P_o in Fig. 1) to the transmitted radiant power (P in Fig. 2).

(e) Make a plot of the absorbances as ordinates against the concentrations, grams per liter as abscissa, of the six calibrating solutions. Because of the method of choosing the base line, the calibration curve intersects the abscissa at a positive concentration value. Thus, the method is not applicable at concentrations below this level. (Note 4)



CSMA 60-20 — Fig. 1
Chromatographic Column



CSMA 60-20 — Fig. 2
Base-Line Construction for Methyl Parathion

Sample Preparation

7. Solid Formulations

(a) Transfer a suitable amount of sample (see Table 1), weighed to the nearest 0.01 g, to the chromatographic column (see Fig. 2) to which has been added, previously, absorbent clay (Hy-Flo Super Cel) to produce a column 25 to 50 mm long (about 5.5 g). Tamp or vibrate the column slightly to settle the contents of the tube. Place a 500-ml wide-mouth conical flask under the tip of the column.

TABLE I

Recommended Sample Weights

Concentration, %w	*Sample Weight[a], g*
2 lb /U.S. gal Emulsible Concentrate	0.4
2% Dust	50
2.5% Dust	40
5% Dust	20
20% Dust Concentrate	4
25% Dust Concentrate	

[a]Chosen to keep the amount of methyl parathion between 0.5 and 1.5 g.

(b) Working in a well-ventilated hood, add a 50-ml portion of extraction solvent to the column. Using a stirring rod, vigorously agitate the sample and the top half of the adsorbent clay layer, forming a slurry with the solvent. Withdraw the stirring rod, and rinse it and the column walls with additional extraction solvent from a wash bottle.

(c) Allow the extraction solvent to percolate through the column, using dry air or nitrogen at 2 to 5 psi pressure, if necessary, to maintain a flow of 5 ml/min. When the height of the solvent above the adsorbent clay layer has diminished to 2 to 3 mm, rinse the column with three successive 10- to 20-ml portions of extraction solvent, allowing each portion to just enter the clay layer before adding the next. Finally, add 50 to 75 ml of extraction solvent to the column, and collect the eluent until the last of the supernatant solvent just enters the clay layer. Rinse the top of the column with extraction solvent to recover any toxicant that may have deposited on it.

(d) Place the conical flask on a steam bath and evaporate the contents to a volume of about 30 to 40 ml. Remove

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lined is for use with a recording infrared spectrophotometer, Perkin-Elmer Model 12C[3], however, the method is suitable for use with any infrared instrument capable of measuring absorbance at the wave lengths specified.

Note 3. The wave-length region used in this analysis is subject to interference from atmospheric moisture unless the spectrophotometer is used in double-beam operation or is flushed with dry nitrogen or air when used in single-beam operation.

Note 4. While 8.16μ is the characteristic peak for methyl parathion at low concentrations, the peak shifts at higher concentrations. The value of P is always determined as the distance from the zero line to the point of maximum absorption.

[1]A standard sample of recrystallized methyl parathion having greater than 99% purity and suitable for use as a photometric standard is available upon request from Shell Chemical Corporation, Agricultural Chemicals Division, Technical Service Department, 460 Park Ave, New York 22, New York.
[2]Manufactured by Johns-Manville Company, 22 East 40th Street, New York 16, N. Y.
[3]Manufactured by Perkin-Elmer Corporation, Norwalk, Connecticut.

the flask and transfer the contents to a 90-mm evaporating dish and take the residue to dryness, using a stream of dry air or nitrogen to evaporate the solvent. Using carbon disulfide, quantitatively transfer the residue to a 100-ml volumetric flask. Determine the toxicant concentration by the infrared procedure described in Section 10. (Note 5).

8. *Liquid Formulations*

(a) Weigh, to the nearest 0.1 mg, from a weighing pipet, an amount of sample into a 10-ml volumetric flask. of methyl parathion, directly into a 10-ml volumetric flask. Dissolve in carbon disulfide and dilute to the mark. Mix thoroughly.

(b) Determine the toxicant concentration by the infrared procedure described in Section 10. (Note 6).

9. *Technical Methyl Parathion, 80%*

(a) Weight, to the nearest 0.1 mg, from a weighing pipet, about 0.1 g of sample into a 10-ml volumertic flask. Dissolve the sample in carbon disulfide and dilute to the mark.

(b) Determine the toxicant concentration by the infrared procedure described in Section 10.

Procedure

10. Fill the 0.2-mm cell of the infrared spectrophotometer with the sample solution. Make duplicate scans of the carbon disulfide sample in the region 7.81μ to about 8.40μ with the same settings as used in 6 and with the same 0.2-mm cell as used for the calibration. Calculate the absorbance for each of the scans as described in Section 6(d) and compute the mean absorbance.

Apparatus Decontamination

11. (a) Following each use, thoroughly flush the 0.2-mm cell with carbon disulfide. Soak all other contaminated apparatus in a saturated alcoholic sodium hydroxide solution for 2 to 3 hr, wash with a hot aqueous solution of a detergent, and rinse with copious amounts of water.

(b) Decompose all 80% methyl parathion solutions with a saturated water-alcoholic (15:85 by volume) sodium hydroxide solution before discarding.

Calculation

12. (a) From the computed mean absorbance, read from the calibration curve the weight of the O,O-dimethyl O-*p*-nitrophenyl thiophosphate (methyl parathion), in grams/100 ml.

(b) Calculate the methyl parathion content of the sample by means of the following equation:

$$\text{Methyl Parathion, \%w} = \frac{W \times V}{S}$$

where:

W = weight of O,O-dimethyl O-*p*-nitrophenyl thiosphosphate, as read from the calibration curve, grams/100 ml.

V = volume of sample solution, milliliters, and

S = weight of sample, grams.

Precision

13. The following data should be used for judging the acceptability of results (95% probability) according to the SMS statistical concept of precision.

(a) Duplicate results by the same operator should be considered suspect if they differ by more than the following amounts:

Solid	4.5% of the mean
Liquid	2.2% of the mean

Formulations

Technical Methyl Parathion

1.4%w

(b) Sufficient data are not available for making an estimate of the reproducibility of this method.

Note 5. An appreciable amount of acetone will interfere in the spectral region used for the determination of methyl parathion. Hence, the residue should be free of all the original extraction solvent.

Note 6. Chromatographic cleanup of liquid formulations is not required for most formulations.

CSMA 61-21
Determination of Methyl Parathion In Formulations and Technical Product Sodium p-Nitrophenate Spectrophotomeric Method
(Tentative)

Scope

1. (a) This method describes a procedure for the determination of methyl parathion, an insecticidally active material consisting of O,O-dimethyl O-*p*-nitrophenyl thiosphosphate. It is applicable to the analysis of such pesticidal formulations as dusts, dust concentrates, wettable powders, granules, emulsible concentrates and other liquid formulations. The method can also be used for the analysis of technical methyl parathion.

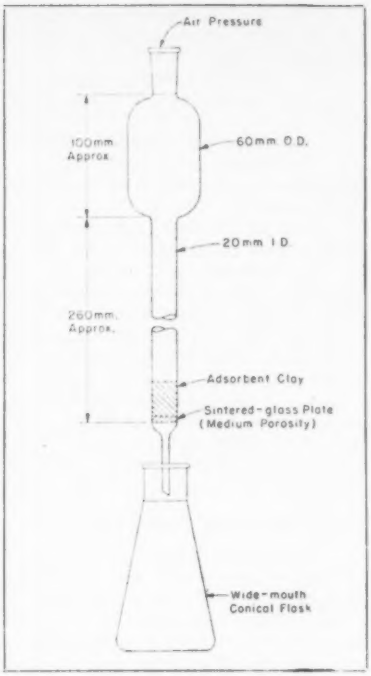
(b) Methyl parathion is measured independently of its degradation products, p-nitrophenol; however, other compounds which hydrolyze in alkaline solution to form the sodium salt of p-nitrophenol will interfere in this determination. The presence of chlorinated hydrocarbon insecticides does not interfere.

Method Summary

2. (a) Liquid formulations or technical methyl parathion are dissolved in, and diluted to a fixed volume with, isopropyl alcohol.

(b) Solid formulations are extracted from their carriers with isopropyl alcohol and the extract evaporated to a small volume, transferred to a volumetric flask and diluted to a fixed volume with isopropyl alcohol.

(c) An aliquot of the alcohol solution is hydrolyzed by boiling with sodium hydroxide and hydrogen peroxide. After proper dilution with water this intensity of the color, due to the yellow sodium p-nitrophenate, is measured photometrically. The intensity of the color of the original solution in sodium bicarbonate-water-alcohol solution is also measured spectrophotometrically to provide a correction for any free p-nitrophenol present in the sample.



CSMA 61-21 — Fig. 1
Chromatographic Column

Warning

3. When testing a highly toxic pesticide such as methyl parathion, take proper precautions to prevent skin contact and inhalation of the dusts and vapors. Whenever possible, work under a hood. Take care to prevent splashing of liquids, billowing of dust and spillage; always wear rubber gloves. Decontaminate all apparatus, and decompose all test solutions after use by the procedure given in Section 11.

Apparatus

4. (a) *Spectrophotometer,* capable of a resolution of 10 mμ in the spectral region of 405 mμ and equipped with matched absorption cells having a 1-cm light path. The spectrophotometer and photometric practices prescribed in this method must conform to the Recommended Practice for Photometric Methods for Chemical Analysis, ASTM E 60. (Note 1).

(b) *Chromatographic Column,* constructed as shown in Fig. 1.

(c) *Hot Plate,* any conventional apparatus with a variable heat control.

Reagents

5. Unless otherwise indicated, it is intended that all reagents conform to the specifications established by the Commit-

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Note 1. A Beckman Model B[1] or an equivalent instrument is recommended. Filter photometers generally have too broad a spectral band for precise analysis and their use is not recommended.

[1]Manufactured by Beckman Division, Beckman Instruments, Inc., 2500 Fullerton Road, Fullerton 1, California.

tee on Analytical Reagents of the American Chemical Society, where such specifications are available.

(a) *Adsorbent Clay.* Use a diatomaceous earth such as Hy-Flo Super Cel[2].

(b) *Hydrogen Peroxide,* 30%w.

(c) *Isopropyl Alcohol,* 99% refined[3], conforming to ASTM D 770 specifications.

(d) *p-Nitrophenol,* reagent grade, melting point 112 to 113°C[4].

(e) *Sodium Bicharbonate-Water-Isopropyl Alcohol Solution,* prepared by adding 25 ml of an aqueous 5% sodium bicarbonate solution and 475 ml of distilled water to 500 ml of isopropyl alcohol.

(f) *Sodium Hydroxide Solution,* approximately 40%w and 0.04%w. Prepare by dissolving 400 and 0.4 g, respectively, of sodium hydroxide pellets in distilled water and dilute to 1 liter.

Spectrophotometer Calibration

6. *Standard Solutions*

(a) *Free p-Nitrophenol.* Weigh 50 mg of standard p-nitrophenol into a 1-liter volumetric flask and dilute to the mark with the sodium bicarbonate-water-isopropyl alcohol solution. Pipet 1, 2, 3, 4 and 5 ml of this solution into 100-ml volumetric flasks and dilute to the mark with the sodium bicarbonate-water-isopropyl alcohol solution. These solutions will contain 0.5, 1.0, 1.5, 2.0 and 2.5 μg/ml of p-nitrophenol.

(b) *Total p-Nitrophenol.* Prepare as in Paragraph (a) except dissolve in the 0.4%w sodium hydroxide solution, and prepare a blank containing only the 0.04%w sodium hydroxide solution.

7. *Calibration*

(a) Measure the absorbance of each of the standard solutions for p-nitrophenol (Section 6a) at a wave length of 405 mμ, using sodium bicarbonate-water-isopropyl alcohol solution as the reference liquid.

(b) Measure the absorbance of each of the standard solutions for total p-nitrophenol (Section 6b) at a wave length of 405 mμ, using 0.04%w sodium hydroxide solution as the reference liquid.

(c) Calculate the absorptivity of each of the standard solutions by means of the following equation, and compute the average absorptivity for each set of standards:

$$\textit{Absorptivity, a} = \frac{(A)\,(v)}{(w)\,(b)}$$ where:

A = absorbance of each of the standard solutions,

v = volume of the standard p-nitrophenol solution (100 ml) prepared for measurement of absorbance, milliliters,

w = weight of p-nitrophenol in each of the prepared standard solutions, micrograms, and

b = length of optical path of the spectrophotometer cell, centimeters. (see Notes 2 and 3).

Procedure

8. *Sample Preparation*

(a) *Dusts, Granules and Wettable Powders.* Transfer a suitable amount of sample (see Table I), weighed to the nearest 0.1 mg, to the chromatographic column (see Fig. 1), containing a 5 to 1.5-cm layer of adsorbent clay; place a 500-ml conical flask at the outlet of the column. Add sufficient isopropyl alcohol, about 50 ml, to form a slurry of the sample with the clay; mix thoroughly with a stirring rod. As the liquid begins to filter into the 500-ml flask, introduce 200 to 300 ml of 99% isopropyl alcohol (see Note 4) to complete the extraction; thoroughly rinse the top of the column with isopropyl alcohol to remove any deposited toxicant. Evaporate the solution on a steam bath until a volume of less than 40 ml remains in the conical flask. Quantitatively transfer this concentrate to a 50-ml volumetric flask, and dilute to the mark with isopropyl alcohol.

TABLE 1

Recommended Sample Sizes

Concentration, %w	*Weight[a], g Sample*
2 lb/U.S. gal Emulsible Concentrate	1.6
2% Dust	20
2.5% Dust	16
5% Dust	8
25% Dust Concentrate	2
25% Dust Concentrate	1.6

[a]Chosen to keep the amount of methyl parathion between 0.3 and 0.5 g.

(b) *Emulsible Concentrates and Solutions.* Mix the sample thoroughly by vigorous stirring or shaking, taking care to avoid any solvent loss. Transfer sufficient sample, weighed to the nearest 0.1 mg, to give 0.3 to 0.5 g of methyl parathion into a 50-ml volumetric flask. Dilute to the mark with isopropyl alcohol at 20°C and mix thoroughly.

(c) *Technical Product, 80% Solution.* Transfer 0.4±0.1 g, weighed to the nearest 0.1 mg, of methyl parathion technical product, to a 50-ml volumetric flask. Dilute to the mark with isopropyl alcohol and mix thoroughly.

9. *Free p-Nitrophenol*

(a) Pipet 1.0 ml of the solution obtained by any of the procedures described in Section 8 into a 100-ml volumetric flask, dilute to the mark with the sodium bicarbonate-water-isopropyl alcohol solution and mix thoroughly. Other dilutions may be required depending upon the capabilities of the spectrometer used.

(b) Transfer a sufficient quantity of this solution to the 1-cm spectrophotometer cell to cover the light path and insert the cell in the spectrophotometer. Within 2 min. after mixing, measure the absorbance of the solution at 405 mμ relative to a sodium bicarbonate-water-isopropyl alcohol blank.

10. *Total p-Nitrophenol*

(a) Pipet 5 ml of the solution obtained by any of the procedures described in Section 8 into a 100-ml volumetric flask, dilute to the mark with isopropyl alcohol and mix thoroughly.

(b) From this 100-ml flask, pipet a 10-ml aliquot into a 125-ml conical flask containing 25 ml of isopropyl alcohol. Add 2 ml of 30%w hydrogen peroxide, mix thoroughly by swirling the contents of the flask, and let stand for 2 min. Add 1 ml of 40%w sodium hydroxide solution and boil gently on the hot plate for a period of not less than 15 min. until the volume is reduced to 2 to 3 ml. Quantitatively transfer this residue into a 1-liter volumetric flask using distilled water to effect the transfer, dilute to the mark with distilled water and mix thoroughly.

(c) Transfer a sufficient quantity of this solution to the 1-cm spectrophotometer cell to cover the light path and within 2 min after mixing, measure the absorbance of the solution at 405 mμ relative to a 0.04%w sodium hydroxide blank.

Decontamination

11. (a) Following each use, thoroughly flush the spectrophotometer cell with isopropyl alcohol. Soak all other contaminated apparatus in a saturated alcoholic sodium hydroxide solution for 2 to 3 hr, wash with a hot aqueous solution of a detergent and rinse with copious amounts of water.

(b) Decompose all 80% methyl parathion solutions with a saturated water-alcohol (15:85 by volume) sodium hydroxide solution before discarding.

Calculation

12. (a) Calculate the free and total p-nitrophenol (PNP) content of the sample by means of the following equations:

$$\textit{Free p-nitrophenol, \%w} = \frac{(5)\,(A)}{(10^2)\,(a)\,(b)\,(W)}$$

$$\textit{Total p-nitrophenol, \%w} = \frac{A}{(10)\,(a)\,(b)\,(W)}$$

Note 2. Since the calibration is linear throughout the chosen concentration range, the absorptivity can be used in calibrations without the need for a calibration curve. Individual sorptivities should not differ from the calculated average by more than one in the third decimal.

Note 3. The approximate absorptivity of the colored form for free nitrophenol is 154±2, (using sodium bicarbonate solution) and for total nitrophenol is 139±2 (using 0.04%w sodium hydroxide solution).

[2]Manufactured by Johns-Manville Co., 22 East 40th Street, New York 16, New York.
[3]Available from Industrial Chemicals Division, Shell Chemical Corporation, 380 Madison Avenue, New York 17, New York.
[4]Manufactured by Distillation Products Industries, Division of Eastman Kodak Company, Rochester 3, New York; Catalog No. 192.

where:

A = absorbance of the diluted solution whose color was measured,

a = calibration absorptivity, ml/μg/cm, as determined for free p-nitrophenol in Section 7,

b = cell length, centimeters (generally 1), and

W = weight of sample, grams (see Note 4).

(b) Calculate the methyl parathion content of the sample by means of the following equation.

Methyl Parathion, %w = (Total PNP-Free PNP) × 1.892

Precision

13. The following data should be used for judging the acceptability of results (95% probability) according to the SMS statistical concept of precision.

(a) Duplicate results by the same operator should be considered suspect if they differ by more than the following amounts:

Repeatability

3% of mean

(b) Sufficient data are not available for making an estimate of the reproducibility of this method.

CSMA 61-22

Determination of Dimethyl-2,2-Dichlorovinyl Phosphate (DDVP) In Formulations Total Chlorine Method

(Tentative)

Scope

1. (a) This method describes a procedure for the determination of DDVP in solid or liquid formulations or in the technical product. DDVP is a pesticidally-active material containing not less than 93% dimethyl-2,2-dichlorovinyl phosphate. Any chlorinated compound other than DDVP will interfere in the method.

(b) More than trace amounts of water and appreciable amounts of organic substances containing labile hydrogen, cause excessive consumption of the sodium-biphenyl reagent, and to that extent interfere. Sulfur-containing materials interefere, but a special procedure is provided to avoid this interference.

Method Summary

2. (a) Liquid formulations and technical products are dissolved directly in toluene. The toxicant in solid formulations is extracted from the carrier with toluene or other suitable solvent, and an aliquot portion taken for analysis.

(b) Excess sodium-biphenyl reagent is added to the toluene solution contained in a separatory funnel. After allowing sufficient reaction time, the excess reagent is destroyed by the cautious addition of water, and the inorganic halide is extracted with water and dilute nitric acid solution.

(c) The chloride content of the aqueous extract is determined by means of the Volhard titration procedure. In the case of colored extracts, or for mixtures of halides, the electrometric method should be used.

Warning

3. When testing pesticides containing highly toxic materials such as DDVP, take proper precautions to prevent skin contact and inhalation of the dusts and vapors. Whenever possible, work under a hood. Take care to prevent splashing of liquids, billowing of dusts, and spillage. Always wear rubber gloves and have adequate face protection; decontaminate all apparatus after use by the procedure in Section 8.

Apparatus

4. (a) *Extraction Column*, 25 x 400 mm.

(b) *Separatory Funnel*, 250-ml capacity. The standard pear shaped type can be used, but a special funnel having an iodine-flask type of neck is preferred since it greatly facilitates rinsing of the stopper.

Reagents

5. Unless otherwise indicated, it is intended that all reagents conform to the specifications established by the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available.

(a) *Hydrazine Sulfate*, crystals.

(b) *Hydrogen Peroxide*, 30%w

(c) *Filter Aid*, use a diatomaceous earth such as Hi-Flo Super Cel[1].

(d) *Nitric Acid Solution*, 6%w. Prepare by adding 60 ml of concentrated nitric acid (sp gr 1.42) to 945 ml of distilled water.

(e) *Sodium Biphenyl Reagent*, approximately 30%w, dispersed in ethylene glycol dimenthyl ether. Premixed reagent, packed in 10 to 14 g individual portions in capped bottles, each sufficient for one determination, is available[2] and is recommended. (see Note 1)

(f) *Sodium Hydroxide Solution*, 40%w. Dissolve 400 g of sodium hydroxide pellets in sufficient distilled water to make 1 liter of solution.

(g) *Toluene*, nitration grade, conforming to ASTM Specification D 841.

Procedure

6. Sample Preparation

(a) Solid Formulations—Add sufficient filter-aid to an extraction column to make a layer about 2 inches deep. Transfer sufficient sample, weighed to the nearest 0.1 mg, containing about 1 to 1.5 g DDVP, to the extraction column, using toluene to effect the transfer. Slurry the top inch of the filter-aid with the sample using a long rod, rinse the rod and allow about 225 ml of toluene in small portions (about 75 ml) to percolate through the sample. Collect the toluene extract in a 250-ml volumetric flask. Dilute the extract to volume and transfer a 25-ml aliquot to a 250-ml separatory funnel. (Note 2)

(b) Liquid Formulations — Mix the liquid formulations thoroughly and weigh sufficient sample to contain 0.5 to 0.08 of chlorine into a 250 ml separatory funnel containing 25 to 30 ml of toluene.

(c) Technical Products — Weigh approximately 0.2 g, to the nearest 0.1 mg, into a 250-ml separatory funnel containing 25 to 30 ml of toluene.

7. Halogen Determination

(a) To the sample in the 250 ml separatory funnel, prepared as described in Section 6, cautiously add 10 to 14 g (one portion) of the sodium biphenyl reagent. Mix by swirling and allow to stand for 5 minutes. If the solution is not dark green in color, add an additional portion of the sodium-biphenyl reagent.

(b) Destroy the excess sodium biphenyl reagent by careful dropwise addition of distilled water, shaking frequently between additions, until the green color has been completely dispelled. Then add 25 ml of 6%w nitric acid, slowly and with intermittent swirling. Stopper the separatory funnel, shake vigorously, and allow the phases to separate. Remove the stopper and carefully rinse the stopper and the walls of the funnel with distilled water; withdraw the aqueous phase into a clean, dry, 250 ml glass-stoppered conical flask. Extract the reaction mixture in the separatory funnel twice more with 25 ml portions of 6%w nitric acid solution, adding the aqueous extracts to the conical flask.

(c) If sulfur is brought into solution by decomposition of emulsifiers or other sulfur-containing compounds, such as methyl parathion, it must be eliminated since it interferes with the subsequent titration of halide. Add 40%w sodium hydroxide to the solution in the conical flask until it is alkaline to phenolphthalein, and add 1 ml in excess. Add 5 ml of 30%w hydrogen peroxide and heat to boiling on a hot plate; boil for approximately 10 min. Remove the flask from the hot plate, allow to cool slightly, and cautiously add a second 5 ml portion of 30%w hydrogen peroxide. Boil the solution for an additional 15 minutes to destroy the excess hydrogen peroxide; a small flake (about 0.05 g) of hydrazine sulfate added to the final solution will decompose the last traces of hydrogen peroxide. Finally, add 6%w nitric acid until the solution is neutral to phenolphthalein.

(d) To the final solutions from either paragraph b or c, add 30 ml of

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Note 1. Preparation of the reagent from sodium and biphenyl is not recommended.

Note 2. If the DDVP content is very low thus requiring an excessive sample size (over 100 g), transfer sufficient sample to contain 0.2 to 0.3 g of DDVP to the extraction column. Extract the sample with toluene, dilute to 250 ml and take a 25 ml aliquot as before.

Note 4. These calculations assume that the dilutions as specified in Section 9 and 10 were made as described; if other dilutions were used, other values for the constant terms 5/10² and 1/10, respectively, will apply.

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[1] Manufactured by Johns-Manville Co., 22 East 40th Street, New York 16, N. Y.

[2] Available from Southwestern Analytical Chemicals, 1107 West Gibson Street, Austin 4, Texas. Material is packed 20 individual bottles to a box.

distilled water and determine the chloride content by means of the Volhard titration procedure (SMS 343). If the DDVP content was low, use the conditions for "Low Halogen Contents" (SMS 343). If two or more halogens are present and it is desired to determine each, or if the solution is colored, use the electrometric titration procedure (SMS 369) for the conditions "Halide, 0.05 to 1 meq." If the DDVP content was low, use the conditions "Halide 0.001 to 0.05 meq" (SMS 369).

Apparatus Decontamination

8. (a) Following each use, soak all contaminated apparatus in 5%w aqueous sodium hydroxide solution for 2 to 3 hr. Rinse copiously with water.

Calculation

9. Calculate the Shell DDVP content, assuming all of the chloride comes from DDVP, by means of the following equation:

$$\text{DDVP, \%w} = \frac{(H)(35.46)(F)}{(10)(W)}$$

where: H = quantity of chloride, milliequavalents obtained from analysis by SMS 343 or 369,
F = factor for coverting %w chloride to %w DDVP (approximate value = 3.1), and
W = weigh of sample or aliquot, grams.

(see Note 3).

Precision

10. The following data should be used for judging the acceptability of results (95% probability) according to a statistical concept of precision*.

(a) Duplicate results by the same operator should be considered suspect if they differ by more than the following amounts:

Repeatability
0.5% of mean

(b) Sufficient data are not available for making an estimate of the reproducibility of this method.

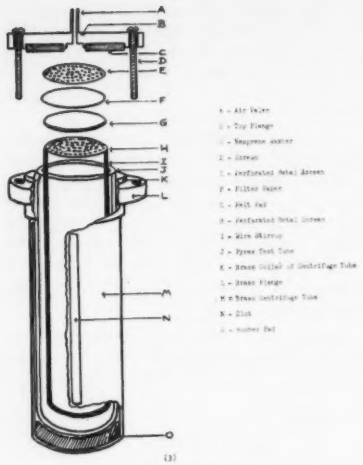
CSMA 61-23
Determination of Freon Insoluble Solids In Pyrethrum Extracts
(Official)

Apparatus

1. See Figure 1.

2. Felt Pad, "G," which is cut to fit the glass tube snugly, must be extracted exhaustively for 24 hours with hexane in a soxhlet extractor before use.

3. Aluminum evaporating dish. Tare on the analytical balance before use. A constant weight must be obtained.



CSMA 61-23 — Fig. 1

Reagents

1. Freon 12. Cylinder is held in an up-side-down position in a suitable rack and has a pressure hose attached to the outlet at the end of which is a fitting that will discharge into the valve on top of the tube. Whenever a new cylinder of Freon is received a blank determination should be run.

2. Benzene, redistilled in glass. This reagent must not be kept in polyethylene containers. A blank determination should be run on the benzene for each new batch.

Procedure

1. Weigh 1.5 grams of pyrethrum extract into the glass test tube. Hang the glass tube in the analytical balance in a wire harness. In the case of hexane-pyrethrum solutions, the tubes should be covered with aluminum foil to prevent evaporation of hexane.

2. Place the Pyrex tube containing the sample into the brass centrifuge tube. Assemble the metal plates, felt pad, and filter paper in the order indicated in the diagram.

3. Tighten the screws.

4. Add 30 grams of Freon from the cylinder. A calibration mark on the side of the glass tube is a satisfactory measure of the quantity of Freon. Shake the tube thoroughly.

5. Place the assembly in a 25°C bath for 30 minutes. Shake occasionally during this time.

6. Place the assembly in the centrifuge and centrifuge for 5 minutes.

7. Turn the assembly up-side-down and discharge the Freon solution completely.

8. Recharge the assembly with 30 grams of Freon. Mix well.

9. Place in a 25°C bath for 5 minutes.

10. Centrifuge for 5 minutes.

11. Discharge the Freon solution as before.

12. Charge an additional 20 grams of Freon, mix well and blow out.

13. Repeat step 12.

14. Remove the screws and open up the tube.

15. Using forceps, remove the filter paper from the assembly and wash with benzene any solids adhering to it into the aluminum evaporating dish.

16. Using forceps, remove the felt pad from the assembly and wash thoroughly with benzene, adding the washings to the aluminum evaporating dish.

17. Finally, using benzene, quantitatively rinse out the glass test tube and the wire stirrup into the aluminum evaporating dish.

18. Evaporate the solution to dryness on the steam bath.

19. Place the dish in an oven at 100°C for 20 minutes.

20. Weigh the dish. It is essential that a constant weight be obtained.

21. Calculation:—

$$\frac{R}{W} \times 100 = F$$

where:
R = Weight of residue in grams
W = Weight of sample, in grams
F = Weight percent of freon insoluble solids.

CSMA 61-24
Determination of Rotenone
(Official)

Scope

Powdered Derris, Cube or Barbasco root or powdered mixes containing such root in the absence of sulfur or other constituents soluble in chloroform. (Applicable to dust mixtures of powdered root with inert, inorganic carriers).

Apparatus

500 ml. g.s. Erlenmeyer flask
Shaking machine
Filter funnel and paper
200 ml. volumetric flask
250 ml. Soxhlet fat flask
50 ml. Erlenmeyer flask marked to 25 ml. level
Ice bath
Gooch crucible and filter paper disks

Reagents

(a) Purified rotenone — Dissolve rotenone in hot CCl_4; cool in refrigerator or ice bath until pptn of rotenone—CCl_4 solvate has ceased. Filter thru Buchner and wash once or twice with ice-cold CCl_4. Conc. filtrate, crystallize, and filter as before. Transfer crystalline residues to beaker, add ca. twice their vol. alcohol and heat nearly to boiling. (Crystals need not dissolve completely.) Cool to room temp., filter thru Buchner, and draw air thru cryst. residue until most of the alcohol is removed. Remove roteone from funnel, dry in air, and finally for 1 hr. at 105°C (Mother liquors may be concd. and rotenone—CCl_4 solvate allowed to crystallize. Cryst. mat-

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Note 3. For more accurate results, the factor, F, should be determined for each batch of DDVP. This can be calculated as follows:

$$F = \frac{100}{C}$$

where: C = chlorine content, %w as determined by SMS 343 or 369 on the batch of DDVP used for the formulation.

*Identical with current recommendations of ASTM Committee D-2.

erial may be used for further purification, or kept for prepn of wash solns or for seeding to induce crystn in analytical procedure.)

(b) Rotenone—CCl_4 solvate—Ppt rotenone from CCl_4 soln, filter by suction, and dry in air.

(c) Rotenone—CCl_4 wash soln—Sat. CCl_4 at 0°C, and keep at 0°C during use.

(d) Alcohol saturated with rotenone at room temp.

(e) Decolorizing carbon — Darco G-60

Procedure

(1) Weigh a sample containing about 1.0-1.5 g. rotenone (for powdered Cube or Derris root usually 30 g.) and transfer to a 500 ml. g.s. Erlenmeyer flask. Add 10g. decolorizing carbon and 300 ml. $CHCl_3$, measured at known room temp., place flask in shaking machine and fasten stopper securely. Agitate vigorously at least 4 hrs., preferably interrupting shaking with overnight rest (or flask may be shaken continuously overnight). Filter mixt. rapidly into suitable flask, using fluted paper without suction and keeping funnel covered with watch glass to avoid loss from evapn. Stopper flask and adjust temp. of filtrate to that of original $CHCl_3$.

(2) Transfer exactly 200 ml. of the soln to 250 ml. Soxhlet fat flask and distill off the bulk of the $CHCl_3$ on a steam bath. Then remove the remainder of the solvent under reduced pressure, heating cautiously on the steam bath when necessary to hasten evapn. (Suction may be applied directly to flask if stopper with vent is used to release pressure, so that excessive vacuum may be avoided and if flasks of suitable strength are employed.) Dissolve ext. in 15 ml. hot CCl_4 and again, in a similar manner, remove all solvent. Repeat with another 10-15 ml. portion hot CCl_4. (This treatment removes all $CHCl_3$ from resins. $CHCl_3$ ext. is usually completely sol. in CCl_4; if small quantities of inso. material are present, purification procedure described later will eliminate them.)

(3) Dissolve residue in ca 10 ml. hot CCl_4 and transfer to 50 ml. Erlenmeyer marked at 25 ml. Rinse the 250 ml. flask with hot CCl_4 to remove last traces of ext., adding wash soln to CCl_4 soln in the 50 ml. flask. If vol. of soln at this point exceeds or is less than 25 ml., adjust to 25 ml. by evapn on steam bath or by addn of CCl_4. Cool flask in ice bath several min., stopper flask, and swirl until crystn is apparent. Seed with few crystals of rotenone—CCl_4 solvate if necessary to induce crystn. If at this stage only small quantity of cryst. material seps, add accurately weighed quantity purified rotenone estimated to be sufficient to assure that final results, expressed as pure rotenone, is at least 1 g. Then warm to effect complete soln, and again induce crystn. At same time prep. satd soln of rotenone in CCl_4 for washing. Place flasks contg ext. and washing soln in ice bath capable of maintaining temp. of 0°C and allow to remain overnight. In order to prevent too rapid melting of ice, ice bath may be stored in refrigerator.)

(4) After 17-18 hrs in ice bath, rapidly filter ext. thru weighed Gooch fitted with filter paper disk, removing flask from ice bath only long enough to pour each fraction of ext. into crucible. Rinse cryst. residue from flask and wash under suction once with the ice-cold satd rotenone—CCl_4 wash soln. (Not more than 12-15 ml. soln should be used for rinsing and washing.) Allow crucible to remain under suction ca 5 min., then dry to constant wt at 40°C (ca 1 hr). Wt obtained is crude rotenone—CCl_4 solvate. Multiply wt. by 0.72 to obtain wt crude rotenone.

(5) Break up contents of crucible with spatula, mix thoroughly, and weigh exactly 1 g. into 50 ml. Erlenmeyer. Add 10 ml. of the alcohol that has been satd with rotenone at room temp., swirl flask few min., stopper tightly, and set aside at least 4 hrs. preferably overnight, at same temp. Filter on weighed Gooch fitted with filter paper disk. Rinse crystals from flask and wash under suction with alcohol satd with rotenone at temp. of recrystn (ca 10 ml. usually required). Continue suction 3-5 min. and then dry crucible at 105°C to constant wt.

(6) Multiply wt residue, expressed in g., by wt total crude rotenone—CCl_4 solvate, and add to product 0.07g. as correction for rotenone held in soln in the 25 ml. CCl_4 used in crystn. If any pure rotenone has been added, subtract its wt from value obtained. This gives wt pure rotenone contained in aliquot of ext., representing ⅔ wt of sample taken.

Note: Most important precaution in using this method is to keep temp. of CCl_4—rotenone wash soln and crucibles as near O°C as possible. Wash soln should be kept surrounded by crushed ice except when actually being used. In warm weather cool crucibles in refrigerator immediately before use.

CSMA 61-25
Determination of Heptachlor by Colorimetric Analysis
(Official)

Scope

This method is designed for determination of heptachlor in formulations. The formulation is extracted with benzene, an aliquot of the benzene extract is reacted with monoethanol-aminebutylcellosolve-potassium hydroxide reagent and the absorbance of the reaction product is determined with a Bausch and Lomb Colorimeter at a wave-length of 5500 A. The concentration is calculated from a heptachlor standardization constant.

Apparatus

Graduated Cylinders, glass stoppered, 100 ml.
Volumetric Flasks, 100 ml.
Graduated Centrifuge Tubes, 25 ml.
Reaction Bath, 100°C.
Bausch and Lomb Colorimeter with 5500 A interference filter or other comparable colorimeter and filter with peak transmission at 5500 to 5700 A.

Reagents

Benzene, Reagent grade.
Heptachlor, reference grade (Velsicol Corporation, Chicago).
Methanol, 90%—reagent grade diluted with distilled waer.
Polen-Silverman Reagent. Prepared by dissolving 33 gm. of 85% reagent potassium hydroxide, in 28 ml. of water, cooling to room temperature, adding 30.5 gm. of monoethanolamine, and diluting to one liter with butyl cellosolve. The monoethanolamine must be freshly distilled, and the butyl cellosolve must be distilled from potassium hydroxide pellets before use. The reagent should be aged for five hours at 50°C.

Procedure

A. *Determination*

Weigh a sample of formulated material containing 10-40 milligrams of actual heptachlor on an analytical balance and transfer to a 100 ml. glass stoppered graduated cylinder or a 100 ml. volumetric flask. Add benzene to the 100 ml. mark, stopper and shake vigorously for several minutes. If the formulation is a solid, allow the material to settle out before proceeding with the analysis. Pipette a one milliliter aliquot of the clear supernatant liquid into a 25 ml. graduated centrifuge tube, add a small boiling chip and one milliter of the Polen-Silverman reagent. Immerse the tubes in a 100°C. constant temperature bath and heat for exactly fifteen minutes. Remove the tubes from the bath and cool immediately in a beaker of cold water. Dilute to 10 milliliters with 90% methanol, mix thoroughly and decant the methanol solution into a curvette. Determine the absorbance (optical density) with a colorimeter at 5500 A 5700 A. using a 90% methanol solution as a blank. Calculate the concentration of heptachlor by dividing the optical density of the sample by a standardization constant (see section below). The per cent heptachlor is calculated from the following equation.

$$\% \text{ Heptachlor} = \frac{\text{O.D.} \times 10}{K \times W}$$

O.D. = Optical density of sample = 100 log % Transmittance

K = standardization constant, O.D./mg./ml.

W = weight of sample in *grams*.

B. Standardization

Prepare standard solutions of reference grade heptachlor in benzene. Concentrations should range from 0.1 mg./ml. to 0.5 mg./ml. of heptachlor. Pipette one milliliter aliquot of each of the standard solutions into 25 ml. graduated centrifuge tubes, add a small boiling stone and one milliliter of Polen-Silverman reagent to each tube. Follow the procedure described under "Determination" beginning with "Immerse the tubes in a 100°C. bath and heat for exactly fifteen minutes." At least three standard solutions should be used and

two replicated from each solution should be analyzed.

A standardization constant is calculated from the absorbances of the standard solutions by dividing the absorbance of a particular solution by the concentration (mg./ml.) of that solution and taking an average of all the replicates.

$$\text{Standarization constant} = K = \frac{\text{Optical Density}}{\text{Concentration (mg./ml.)}}$$

The standardization constant should be determined daily.

Caution

In evaluation of technical heptachlor and its formulations, care and precaution must be taken to remove any possible hazards to the personnel handling these materials. In the case of accidental skin contact with technical heptachlor or its formulations, the contacted areas should be washed thoroughly with soap and water.

Reference

The Bulletin No. 504-17, "Evaluation of Technical Heptachlor Formulations," Velsicol Chemical Corporation.

CSMA 61-26
Determination of Heptachlor by Gravimetric Analysis
(Tentative)

Scope

This is a method for determining the heptachlor content of technical heptachlor and heptachlor formulations.

Apparatus

250 ml. Erlenmeyer Flask
50 ml Volumetric Flask
Soxhlet Extractor
Reflux Condenser
30 ml Fritted Disk Pyrex Crucible of Medium Porosity

Reagents

Nitrict Acid 1:1 Volumetrically (ca. 7.7 N). Dilute reagent grade concentrated nitric acid with an equal volume of distilled water.

Silver Nitrate-Acetic Acid Solution 0.1 N. Dissolve 17 gms. of reagent grade silver nitrate in 100 ml. of distilled water, add 56 ml. of 1:1 (by volume) nitric acid reagent grade, dilute to one liter with glacial acetic acid.

Procedure

A. Preperation of Sample

Technical Heptachlor. The entire contents of the drum to be sampled should be melted at 160°F. The heptachlor should be stirred for ten minutes after all the solids have dissolved. A one-half pint sample is drawn off in a glass container and saved for analysis. Immediately prior to weighing samples in the laboratory the contents of the glass container are similarly melted and stirred. The analytical weighings are taken on homogeneous samples of the melt.

Emulsifiable Concentrates Or Heptachlor In Oil Solvents are analyzed directly by weighing (to the nearest 0.1 mg.) samples of the formulated material to contain 1.0-1.5 g. of actual heptachlor. The sample is weighed into a 24/40 standard tapered 250 ml. Erlenmeyer flask and analyzed as shown below.

Dusts, Granular Impregnated And Wettable Powders are sampled and weighed so as to contain 5-7 g. of actual heptachlor. The formulation is then extracted with n-pentane* or diethyl ether in a Soxhlet extractor, concentrated on a water bath at 50°C.and brought to a volume of 50 ml. in a volumetric flask. A 10 ml. aliquot is transferred to a 250 ml. Erlenmeyer flask, the solvent evaporated on a 50°C. water bath and the sample analyzed.

B. Analysis

To the formulation or extracted formulation in the Erlenmeyer flask add 50 ml of 0.1 N silver nitrate-acetic acid solution. Connect the flask to a reflux condenser and heat under moderate reflux for 45 minutes from the time the solution starts to boil. A boiling chip will help to maintain uniform boiling. Wash down the reflux condenser with several milliters of glacial acetic acid followed by 60 ml. of distilled water Allow the flask to cool and add 10 ml. of 1:1 nitric acid. Collect the precipitated silver chloride on a weighed and dried (to constant weight) 30 ml. fritted disc pyrex crucible of medium porosity. Wash the precipitate twice with hot glacial acetic acid and twice with dilute nitric acid. Finally rinse with reagent grade acetone and dry the crucible in an oven at 110°C. for one-half hour. Remove crucible and allow to cool in a dessicator for 15 minutes. Calculate the per cent of heptachlor in the sample by dividing by the sample weight and multiplying by the ratio of the molecular weights of heptachlor and silver chloride as shown below:

$$\%\ \text{Heptachlor} = \frac{\text{Wt. AGCl (g.)} \times 261.1}{\text{Wt. Sample (g.)}}$$

The method shows the percent of heptachlor accurately to ±0.3%.

Caution

In evaluation of technical heptachlor and its formualtions, care and precaution must be taken to remove any possible hazards to the personnel handling these materials. In the case of accidental skin contact with technical heptachlor or its formulations, the contacted areas should be washed thoroughly with soap and water.

Reference

The Bulletin No. 504-17, "Evaluation of Technical Heptachlor Formulations," Velsicol Chemical Corporation.

*n-pentane or diethyl ether are preferred extraction solvents since a loss of heptachlor is observed when high boiling solvents are used.

CSMA 61-27
Determination of Heptachlor by Potentiometric Analysis
(Tentative)

Scope

1. This is a method for determining the heptachlor content of technical heptachlor and heptachlor formulations.

Apparatus

2. 250 ml. Erlenmeyer Flask
50 ml Volumetric Flask
Soxhlet Extractor
Reflex Condenser
50 ml. Pipette
Water Cool Liebig Condenser
650 ml. Beaker
Glass Motor-Driven Stirrer
Glass Electrode (such as Beckman No. 1190-80).
Silver electrode (such as Beckman No. 1281-5).
Potentiometer or pH-Meter (such Beckman Model G, M or H-2).

Reagents

3. *Silver Nitrate-Acetic Acid Solution 0.1 N.* Dissolve 17 gms. of reagent grade silver nitrate in 100 ml. of distilled water, add 56 ml. of 1:1 (by volume) nitric acid reagent grade, dilute to one liter with glacial acetic acid. This is standardized potentiometrically by adding 50 ml. of the solution to a mixture of 200 ml. of glacial acetic acid and 50 ml. of distilled water in a 600 ml. beaker. Place the beaker in position for analysis with the glass and silver electrodes immersed in the solution and record the solution temperature, t°C. Stir the solution with a glass motor driven stirrer, and titrate with 0.1 N primary standard sodium chloride solution (below) to the point of maximum change of electromotive force (e.m.f.) per ml. of titrant according to the standard procedure for potentiometric determination of the end point. Calculate the volume, V_{20}, of silver nitrate corrected to 20°C. from the approximation $V_{20} = 50—0.25\ (t°—20°)$ and from this determine the normality of silver nitrate.

$$\text{Na} = \text{Normality } AgNO_3 = \frac{N_1 \times \text{ml. NACl}; N_1}{V_{20}} = \text{normality NaCl solution}$$

Sodium Chloride 0.1 N Primary standard. Weigh accurately to 0.1 mg. 5.85 g.. of dry reagent grade sodium chloride and dilute volumetrically to one liter with distilled water at 20°C. Calculate the exact amount of sodium chloride in the solution from the weight used and the assay of the reagent grade material. Then the normality,

$$N_1 = \text{Normality NaCl} = \frac{\text{Wt. NaCl}}{58.454}$$

Procedure

4. *A. Preparation of Sample*

Technical Heptachlor. The entire contents of the drum to be sampled should be melted at 160°F. The heptachlor should be stirred for ten minutes after all the solids have dissolved. A one-half pint sample is drawn off in a

glass container and saved for analysis. Immediately prior to weighing samples in the laboratory the contents of the glass container are similarly melted and stirred. The analytical weighings are taken on homogenous samples of the melt.

Emulsifiable Concentrates or Heptachlor in Oil Solvents are analyzed directly by weighing (to the nearest 0.1 mg.) samples of the formulated material to contain 1.0-1.5 g. of actual heptachlor. The sample is weighed into a 24/40 standard tapered 250 ml. Erlenmeyer flask and analyzed as shown below.

Dusts, Granular Impregnates and Wettable Powders are sampled and weighed so as to contain 5-7 g. of actual heptachlor. The formulation is then extracted with n-pentane* or diethyl ether in a Soxhlet extractor, concentrated on a water bath at 50°C. and brought to a volume of 50 ml. in a volumetric flask. A 10 ml. aliquot is transferred to a 250 ml. Erlenmeyer flask, the solvent evaporated on a 50°C. water bath and the sample analyzed.

Weigh (to the nearest 0.1 mg.) a sample of 1.0-1.5 g. technical heptachlor in a 250 ml. Erlenmeyer flask. Pipette 50 ml. of standardized 0.1 N silver nitrate reagent into the flask and attach the water-cooled Liebig condenser. Reflux the solution for 45 minutes, noting the time from the first occurrence of boiling. A clean carborundum chip in the solution assists in maintaning uniform boiling.

Wash down the condenser with 25 ml. of glacial acetic acid, rinse the tip of the condenser with 10 ml. of distilled water and cool the reaction mixture to room temperature. Transfer the solution quantitatively into a 600 ml. beaker and rinse the Erlenmeyer flask with four 10 ml. portions of distilled water and 175 ml. of glacial acetic acid.

Immerse the glass and the silver electrodes, connected to the poteniometer, in the solution. Stir the solution with a glass motor driven stirrer. Titrate with 0.1 sodium chloride to a potentiometrically determined end-point.

The heptachlor content of the sample is calculated by multiplying the net milliequivalents of silver (those used to react with the labile chloride atom from the heptachlor) by the milliequivaent weight per cent to heptachlor and dividing by the weight of the sample in grams.

$$\% \text{ Heptachlor} = \frac{37.335\ (50\ N_2\text{—ml. NaCl} \times N_1)}{\text{Wt. of sample (g.)}}$$

Caution

5. In evaluation of technical heptachlor and its formulations, care and precaution must be taken to remove any possible hazards to the personnel handling these materials. In the case of accidental skin contact with technical heptachlor or its formulations, the contacted areas should be washed thoroughly with soap and water.

*n-pentane or diethyl ether are preferred extraction solvents since a loss of heptachlor is observed when high boiling solvents are used.

Reference

6. The Bulletin No. 504-17, "Evaluation of Technical Heptachlor Formulations," Velsicol Chemical Corporation.

CSMA 61-28
Determination of Heptachlor In Technical Heptachlor and Formulations
(Tentative)

Scope

1. This method describes a procedure for the determination of Heptachlor content in Technical Heptachlor and Formulations containing Heptachlor.

Reagents

(a) Standard silver nitrate solution (0.1 N): Dissolve 17 g silver nitrate in 125 ml of distilled water and 25 ml concentrated nitric acid and dilute to one liter with glacial acetic acid. Standardize against the sodium chloride solution using the titration given in the procedure.

(b) Standard sodium chloride solution (0.1 N). Dissolve 5.845 g pure sodium chloride in one liter of water.

Procedure

Weigh a sample containing between 200 and 350 mg heptachlor into a 250 ml standard taper Erlenmeyer flask. Add 25-50 ml glacial acetic acid and warm gently if necessary to dissolve the heptachlor. Add 25 ml of the standard silver nitrate solution (1) with a pipette and reflux for 45 minutes.

Cool, and quantitatively wash the contents of the flask into a 400 ml beaker using 80% acetic acid and adjust the volume to about 300 ml. Titrate the excess $AgNO_3$ with the standard sodium chloride solution (2) potentiometrically, using a silver electrode and a glass electrode, and a magnetic stirrer.

Using the Fisher titrimeter, the potential is set at 0.50 at the start. The endpoint is at about 0.27 and the change in potential is very sharp.

Calculation

The volume of sodium chloride solution corresponding to the sample is the volume equivalent to 25 ml standard silver nitrate solution minus the titration. Calculate the percentage of heptachlor, one ml 0.1 N NaCl = 0.03733 g heptachlor.

Reference

Analysis of Technical Heptachlor and Heptachlor Formulations, Velsicol Chemical Corporation Sept. 30, 1952.

CSMA 61-29
Lindane Dusting Powder
(Tentative)

Scope

1. This method covers dusting powder, lindane insecticide for use in the control of body, crab, and head lice, fleas, bedbugs, and other crawling insects.

Requirements

2. (A) *Composition and form.*—The insecticide shall be a uniformly mixed powder and shall contain 1.0 ± 0.05 percent lindane, determined as specified in 4(A) and an inert diluent.

(B) *Lindane.*—The lindane shall be the gamma isomer of 1, 2, 3, 4, 5, 6-hexochlorocyclohexane of a purity not less than 99 percent. It shall be a white crystalline substance having a melting point of not less than 112°C., when determined as specified in 4(B). Conformance of the lindane with the requirements specified herein shall be certified by the manufacturer in a certificate of compliance to the contracting officer.

(C) *Mixed melting point of extracted lindane.*—The melting point of a mixture of equal weights of lindane extracted as specified in 4(B) and authentic lindane shall not be lower than 100°C. when tested as specified in 4(B).

(D) Diluent.—The diluent shall be pyrophyllite or talc of such degree of fineness that not less than 99 percent will pass a U. S. Standard No. 100 (149 micron) sieve by dry test as specified in 4(D).

Physical Form

3. (A) *Sieve size.*—The finished insecticide powder shall be a fine free-flowing material devoid of lumps. It shall be of such fineness that not less than 99.0 percent will pass a U. S. Standard No. 100 (149 micron) sieve by dry test when tested as specified in 4(D). The sieve residue shall contain not more than 1.5 mg. lindane per gram of original sample when tested as specified under 4(A).

(B) *Surface mean particle diameter.*—The finished insecticide powder shall have a surface mean particle diameter of not more than 5 microns when tested as specified in 3(E).

(C) Reaction.—A suspension of the finished powder, prepared and tested as specified in 4(F), shall have a pH value not lower than 5.0 and not higher than 9.0.

Tests

4(A) *Composition.*—Extract 20 grams of the finished insecticide powder, accurately weighed, in a Soxhlet extractor with 100 ml. of n-hexane for 6 hours, using a previously weighed extraction flask. Distill off the acetone. Dry the residue at 50° C. to constant weight. Compute the percentage of acetone soluble matter as percent lindane. (Reserve the acetone-soluble product for the test specified in 4(C).

(B) *Melting point.*—Melting point shall be determined by the capillary tube method using a Thiele-Dennis type or equivalent melting tube, heating at a rate not to exceed 0.5° C. per minute. Initial reading shall be taken when first appearance of liquid is observed and final reading, when the sample is completely liquefied.

(C) *Melting point of extracted lindane.*—Mix equal parts of the dried lindane extract and authentic lindane by gentle grinding with a spatula. Determine the melting point as specified in

4(B). The melting point is assumed to be the mean of initial and final readings, providing spread is not over 6° C.

(D) *Sieve size.*—Sieves shall conform to Specification RR-S-366. Screen a dry 20-gram sample through a U. S. Standard sieve of the designated mesh size, using a single-eccentric type mechanical shaker which imparts to the sieve a rotary motion and tapping action of uniform speed of 300 ± 15 gyrations and 150 ± 10 taps of the striker per minute. Continue the screening for 15 minutes. Weigh the residue and calculate the percentage passing through the sieve.

(E) *Surface mean particle diameter.*—The surface mean particle diameter shall be determined by the air permeation method;[1] or by an equivalent method using the Fisher Sub-Sieve sizer, employing a sample whose weight in grams is numerically equal to the specific gravity of the powder.

(F) *Reaction.*—Shake a suspension of 20 grams of the finished insecticide and 80 ml of distilled water in a glass stoppered Erlenmeyer flask at intermittent intervals, during the course of one hour. Filter the suspension through a quantitative filter paper and determine the pH of the filtrate by any suitable method. In the event of a dispute, however, the results obtained with a calibrated pH electrometer shall govern.

Instructions for use

For body lice: Dust entire inner surfaces of undergarments, especially seams; also inner seams of trousers and shirt. Rub treated areas lightly by hand to spread powder evenly. Repeat every week and following each change of clothing. Complete treatment will require about 1 ounce of one-half the contents of this container.

For fleas: Dust garments as described for body lice above, including treatment of socks above shoe tops.

For pubic (crab) lice: Apply to all regions of body where coarse hair is present. Repeat at end of 1 and 2 weeks.

For head lice: Apply lightly to hair. Rub well, repeat at end of 1 and 2 weeks.

For crawling insects while sleeping: To aid in repelling or killing fleas, ants, bedbugs, and other crawling insects, dust lightly about 1 ounce of powder to blankets and to soil or floor immediately surrounding the bedding.

Caution

For external use only. Keep away from food and mess gear. Respirator or face mask should be used if powder is dispensed into air with dust gun or blower and one hour allowed for dust to settle before reentering.

The following additional precautions should be observed:

a. Limitation of the amount of the skin dusting powder containing 1.0 percent Lindane in 99.0 percent inert dust to be used in a single hand-operated or a single power-operated dusting of an individual to not more than 60.0 grams.

b. Redusting of personnel, when necessary will not be performed until after the lapse of *seven* (7) full days from the time of completion of a previous dusting.

c. The individual two (2) ounce can of skin dusting powder containing 1.0 percent Lindane in 99.0 percent of inert dust will not be used by personnel who have been dusted by a hand-operated or a machine-operated duster until not less than seven (7) full days elapsed following such a hand or machine dusting.

d. Whenever possible troops should bathe prior to being dusted or redusted with 1.0 per cent Lindane in 99.0 percent inert dust.

e. Not to be used in conjunction with insect repellents or other oily liquids applied to the skin.

Instructions for use

For head or crab lice: Dust into infested hairy portions of body and work down to base of hair with finger tips. Repeat at end of 1 and 2 weeks to kill lice hatched from eggs.

For body lice: Remove clothing, turn inside out, and dust lightly over entire inner surface, rubbing powder well into all seams. Repeat at weekly intervals until infestation is controlled.

1. To dust persons without removing clothing: Fill duster ¾ full and adjust to deliver heavy cloud of powder at each stroke.
2. Dust inside of hat and replace on head.
3. Extend arms at side shoulders height. Insert delivery tube slowly up each sleeve between skin and inner garment. Blow powder into armpit and about shoulder. Also between individual layers of clothing.
4. Insert tube at back of neck, dusting back and neckband.
5. Insert tube in front at neck and dust toward armpits, both sides of body, chest, and abdomen.
6. Loosen trousers, insert tube between skin and innermost garments, and powder generously crotch and pubic area, also underdrawers, especially waist and side seams.
7. Insert tube down rear of trousers next to skin and powder buttocks and rear of crotch.
8. Dust in socks.

For fleas: For flea control in buildings, apply to cracks, crevices, and rodent runways. Apply to floor areas as a thin, uniform film of powder at the rate of ¼ to ½ pound per 1,000 square feet. For treating infested grounds, apply the powder at the rate of 1 pound per 1,000 square feet or 40 pounds per acre.

CSMA 61-30
Determination of Thiram by Ultraviolet Spectrophotometry
(Tentative)

Scope

1. This method describes a procedure for the determination of Thiram by ultraviolet spectrophotometry.

Reagents

2. Thiram (Tetramethylthiuram disulfide). Melting point 148°. May be purified by recrystallization from chloroform-ethyl alcohol.

Standard solution: Thiram, 10 micrograms/ml in chloroform. Transfer 100 mg thiram to a 100 ml volumetric flask, make to volume with chloroform, quantitatively dilute 5 ml to 50 ml and dilute 5 ml of this solution to 50 ml.

Determination

3. Prepare a chloroform solution of the sample, aliquoting if necessary, containing about 10 micrograms/ml of thiram. Determine the absorbance at 280 mμ of the sample and standard solutions with chloroform as the blank, using the Beckman spectrophotometer, model DU, and 1 cm silica cells. Calculate the percentage of thiram from the absorbances for sample and the standard. The absorbance for a solution containing 10 micrograms thiram/ml is about 0.505.

The absorbance curve for the sample may be determined to aid in the identification of thiram. The absorbance from 285 mμ to 260 mμ is nearly constant, with a silght maximum at 280 mμ. Other substances such as ziram that absorb at 280mμ interfere.

CSMA 61-31
Method for the Determination of Total Phosphorus in Malathion
(Tentative)

Scope

This method describes the analysis of Malathion in liquids and dusts by the determination of total Phosphorous via magnesium pyrophosphate.

Reagents

A. *Liquids*

(a) *Ammonium Molybdate Solution*—Dissolve 100 grams of molybdic acid in dilute ammonium hydroxide (144 ml of strong ammonium hydroxide and 271 ml of water), pour this solution slowly, and with constant stirring into dilute nitric acid (489 ml of strong nitric acid and 1148 ml of water). Keep the mixture in a warm place for several days or until a portion heated to 40°C deposits no yellow precipitate of ammonium phosphomolybdate. Decant the solution from any sediment and preserve in glass-stoppered vessels.

(b) *Ammonium Nitrate Solution*—Dissolve 100 grams of ammonium nitrate, free from phosphates, in water and dilute to 1 liter.

(c) Magnesia Mixture—Dissolve 55 grams of crystallized magnesium chloride ($MgCl_2 \cdot 6H_2O$) in water, add 140 grams of ammonium chloride, 130.5 ml of ammonium hydroxide and dilute to 1 liter.

(d) *Dilute Ammonium Hydroxide for Washing*—Dilute 100 ml of strong ammonium hydroxide to 1 liter (this solultion should contain not less than 2.5% ammonia, NH_3 by weight).

Determination

Transfer a sample or an aliquot from a chloroform extract containing approximately 0.2 g of malathion into a

[1]This method is described in Industrial and Engineering Chemistry, Analytical Edition, Volume 12, No. 8, pp. 470-482, 15 August 1940, with modifications as to the compaction of sample, described in *Ibid.*, Volume 13, No. 7, pp. 483-484, 15 July 1941.

500 ml Kjeldahl flask. Add 5 ml of conc. H_2SO_4 and mix by swirling; cautiously add conc. HNO_3 drop by drop until the vigorous reaction is completed, then about 5 ml excess. Add 6 small beads and place flask on digestion rack equipped with an asbestos mat having an opening of two inches diameter. Heat over a free flame on digestion apparatus until the dense nitric oxide fumes have been expelled. Add a few drops of HNO_3 and continue heating and addition of nitric acid until the organic matter has been destroyed, as evidenced by colorless or light yellow solution. Cool, add 10 ml of water, again cool, wash contents of flask into a 400 ml beaker. If not clear, filter through a small paper while transferring. Add about 5 grams of ammonium nitrate (50 ml of the nitrate solution) and dilute to about 200 ml. Add ammonum hydroxide to slight alkalinity and then make distinctly acid with nitric acid. Heat the solution to about 65°C, add 60 ml of the ammonium molybdate, stir and digest at about 65°C for 30 minutes, or longer, if necessary to obtain a clear supernatant liquid. Determine whether the phosphorus has been completely precipitated, by adding more molybdate solution to the supernatant liquid as soon as it has cleared. Filter and wash five times by decantation with the ammonium nitrate solution. Test the filtrate with more ammonium molybdate solution to make certain enough has been used to precipitate all the phosphorus.

Dissolve the precipitate on the beaker with NH_4OH (1 + 1). Wash with hot water and catch the washings in the beaker containing the rest of the precipitate. Add sufficient ammonium hydroxide to dissolve the remainder and dilute to about 100 ml with water.

Neutralize with HCl, cool, and add 20 ml magnesia mixture drop by drop with constant stirring. Allow to stand for 15 minutes, add 12-15 ml of strong ammonium hydroxide and allow to stand either overnight or two hours in an ice bath. Filter, through a tared platinum Gooch crucible previously ignited for 30 minutes in a muffle at temperature between 900°-1000°C, wash with (1 + 9) ammonium hydroxide until free from chlorides as evidenced by test with $AgNO_3$ solution. Dry, ignite 30 minutes in a muffle at 900°-1000°C. until the residue is white, cool and weigh as magnesium pyrophosphate. From this weight, calculate the percentages of phosphorus and malathion in the sample as follows:

$$\frac{\text{Weight of sample}}{\text{Grams } Mg_2P_2O_7 \times 0.2783} \times 100 = \% \text{ P}$$

$$\% \text{ P} \times 10.6638 = \% \text{ Malathion}$$

Notes: In cases where it is impractical to make the determination from a sample charge by a direct weighing, a larger sample may be taken, mixed in a volumetric flask with chloroform, and an aliquot taken for an analysis.

Constant weights of the magnesium pyrophosphate residues were obtained by heating in a muffle at a temperature between 900°-1000°C. for ½ hour.

B. *Dusts*

This method was devised principally for the analysis of water miscible malathion sprays. For the analysis of malathion in dusts, it is recommended that a sample not to exceed 50 gm. be transferred to a glass-stoppered Erlenmeyer flask, and shaken for two hours on a shaking machine with 200 ml chloroform. Analysis of the total phosphorus should then be made on an aliquot of the filtered extract containing about 0.2 g of malathaion by the above method. During filtration of the extract, a watch glass should be placed over the funnel to prevent evaporation loss.

CSMA 61-32
Determination of Organic Thiocyanates
(Tentative)

Scope

Insecticidal sprays and concentrates from aerosols after removal of propellent.

Apparatus

250 ml. g.s. Erlenmeyer Flask
Separatory Funnel
600 ml. beaker
2" Buchner Funnel
800 ml. Kjeldahl Flash

Reagents

(a) Strong potassium polysulfide solution—Dissolve 180 grams of KOH in 120 ml. of water. Saturate 100 ml. of this solution with H_2S (about 42 grams) while cooling. Add the other 100 ml. of KOH solution and 80 grams of sulfur. Shake until dissolved.

(b) Sodium sulfide ($Na_2S \cdot 9H_2O$)

(c) Mixed sulfide solution — To 100 ml. of (a) add 50 grams of (b), 30 grams of KOH, and 200 ml. of water.

(d) Sodium bisulfite ($Na_2S_2O_5$ or $NaHSO_3$)

(e) Sulfur dioxide

(f) Copper sulfate solution (20% $CuSO_4 \cdot 5H_2O$)

(g) Potassium hydroxide solution (10%)

(h) Sulfuric acid—(1 + 4)

(i) Wash solution—To 300 ml. of water add 1 ml. of (h), 1 gram of (d), 10 ml. of (f), 12 grams of Na_2SO_4, and pass SO_2 into the solution for 10 minutes.

Procedure

(1) Weigh a quantity of sample preferably containing about 0.03 grams of thiocyanate nitrogen into a 250 ml. glass-stoppered Erlenmeyer flask. (If the percentage is very low, the weighed quantity should not be increased unduly without correspondingly increasing the quantity of mixed sulfide solution (c) used. 20-25 grams of fly spray is usually sufficient.) Add 35 ml. of the mixed sulfide solution (c). Shake vigorously at room temperature for 10 minutes, during which time reaction is nearly completed; next heat to 70°C. on a steam bath, carefully releasing the pressure resulting from heating; and shake at the temperature of 70°C. for 15 minutes more. Cool.

(2) *Removal of petroleum oil*—Dilute and transfer to a separatory funnel with about 300 ml of water. Add 50 ml. of petroleum ether, shake, and draw off that aqueous layer into a 600 ml. beaker. Wash the petroleum ether layer with two 10 ml. portions of water, which add to the main solution. (If emulsions occur during the washing process, they may be broken by acidifying with H_2SO_4 (1 + 4), using a piece of litmus paper as outside indicator. Add 2 ml. of H_2SO_4 (1 + 4). Bring the mixture to a boil quickly and boil for 8 minutes to remove H_2S. Cool. If fatty acids or other oils are present at this stage, transfer to a separatory funnel, extract with petroleum ether, and return the aqueous phase to the original beaker. Filter through a small Buchner funnel and transfer the filtrate to a beaker.

(4) Neutralize to litmus paper with 10% KOH and add 1 ml. of H_2SO_4 (1 + 4). Add about 1 gram of $Na_2S_2O_8$ and stir until dissolved. Add excess (about 15 ml.) of 20% copper sulfate solution and pass SO_2 into the solution for 10 minutes. Allow the precipitated cuprous thiocyanate to settle for 2 hours and filter with suction through a 2-inch Buchner funnel. Coat the Buchner funnel with a layer of asbestos fibers, a layer of diatomite and finally a third layer of asbestos fibers. If the filtrate is not clear, centrifuge the sample at 2000 r.p.m. for 10-15 minutes and pour through the filter a second time.

(5) Wash the filter and precipitate once or twice with the wash solution, continue suction until filter pad is dry, and transfer to an 800 ml. Kjeldahl flask. (This may conveniently be done by folding it in a filter paper together with bits of moist filter paper used to wipe out the Buchner funnel. Then place the whole in the Kjeldahl flask.) Add a few glass beads, 35 ml. of concentrated H_2SO_4, 10 grams of K_2SO_4, and about 0.7 g. of HgO or 0.6 g. of metallic Hg. Digest until white and for 15 minutes thereafter.

(6) Determine the nitrogen by the official method (Methods of Analysis, A.O.A.C., 7th Edition, 1950, page 12, par. 2.22) beginning with the words "After cooling, dil. with . . ." Run a blank analysis on the paper and filtering pad.

(7) The following factors can be used for conversion:

(a) Isobornyl thiocyanoacetate
% Nitrogen in sample x 18.084 = % by wt. isobornyl thiocyanoacetate

(b) B-butoxy b'thiocyano-diethyl ether
% Nitrogen in sample x 14.573 = % by wt. of B-butoxy b'thio cyano-diethyl ether

(c) B-thiocyanoethyl esters of aliphatic fatty acids whose average carbon atoms is from ten to eighteen
% Nitrogen in sample x 21.263 = % by wt. of B-thiocyanoethyl esters of aliphatic fatty acids whose average carbon atoms is from ten to eighteen

(d) Commercial Products

% Nitrogen in sample x 22.054= % by wt. Thanite

% Nitrogen in sample x 26.739= % by wt. Lethane 384

% Nitrogen in sample x 38.242= % by wt. Lethane 60

% Nitrogen in sample x 34.506= % by wt. Lethane 384 Special

Ref. U.S.D.A. Test No. 741.13 (J.A.O.C. 28 (1945), 363) and 741.11.

CSMA 61-33
A Modified Procedure for the Determination of Methoxychlor [2,2-bis (p-methoxyphenyl) 1,1,1-trichloroethane]

(Tentative)

Scope and Definition

1. The method of Fairing and Warrington (1) for the determination of methoxychlor (2,2-bis (p-methoxyphenyl) 1,1,1-trichloroethane) is sensitive and specific for this insecticide. However, in attempting to apply the method to the determination of residues on fruits and vegetables which had been experimentally dusted and then canned, it was found that off-colors and turbidity, which invalidated the results, developed in the step of the analysis where a red color is produced and used to measure the quantity of methoxychlor present.

The procedure which is presented here embodies the essential steps of the Fairing and Warrington method, except with respect to the means utilized to free the sample extracts of substances which interfere with the analysis. Since an earlier report was made (January, 1950, unpublished) on the modified procedure certain details have been changed toward improvement in the method.

Experience with a considerable number of analyses indicates that a standard curve cannot be used for evaluating the results obtained from the analysis of several batches of samples. The reason for this is that the sulfuric acid used to develop the color, which is read on the spectrophotometer or colorimeter in the final step of the analysis, is neither of definite nor fixed composition. Therefore, different days, will not produce the same color intensity with a given amount of dehydrochlorinated methoxychlor. The difficulty is overcome by running a small series of standards with each batch of samples.

Outline of Method

2. The several steps involved in the analysis are as follows:

(a) Extraction of the methoxychlor from the sample material by means of a solvent.

(b) Dehydrochlorination of the methoxychlor by heating with alcoholic potassium hydroxide.

(c) Separation of the dehydrochlorinated methoxychlor by extraction with an immiscible solvent.

(d) Removal of pigments, waxes and unsaponifiable fractions of fats from the extract by means of an adsorption column.

(e) Reaction of the dehydrochlorinated methoxychlor with 85% sulfuric acid to produce a red color.

(f) Measurement of the color intensity on a spectrophotometer or colorimeter.

Reagents

3. n-Hexane ("Skellysolve" B, b.p. 60°-70° C.), redistilled, or passed through a column of activated silica gel.

Anhydrous sodium sulfate, technical, fine powder.

Alcoholic potassium hydroxide, 5% (freshly prepared on day of use).

Acetone, reagent grade.

"Attasol" (Attapulgus Clay Co.).

"Hyflo Super-Cel."

Ethyl ether, peroxide free.

Sulfuric acid, 85% (± 1%) with 10-20 mg. of ferric chloride per liter added.

Sodium chloride, saturated solution.

Standard methoxychlor solution, 10 mg. of recrystallized methoxychlor per liter in ethanol.

Procedure

4. Extraction of Samples

Extract the methoxychlor from the samples by blending, or rotating in a tight container, with one milliliter of hexane per gram of sample weight. The character of the samples will dictate the method used to extract them. Adequate contact between sample and solvent must be assured. Separate the extract from the sample. Centrifuging may be necessary and, where emulsions are encountered, the addition of anhydrous sodium sulfate or a saturated solution of ammonium sulfate will aid in effecting separation. Dry the extract by passage through a layer of anhydrous sodium sulfate, 3-4 cm. deep. Protect the extract from evaporation at all times, since an aliquot of the volume of solvent used for extraction is taken as the sample to be analyzed. Transfer a suitable aliquot of the extract to a large test tube (approximately 32 mm. x 150 mm.). The aliquot should be selected to contain 15 to 50 micrograms of methoxychlor. Usually 25 ml. is a satisfactory volume for dust or spray residue determinations.

5. Saponification and Extraction

Evaporate the extract sample to dryness in a water bath at 40°-45° C. with a small jet of air directed into the tube to hasten evaporation.

Add 10 ml. of 5% alcoholic potassium hydroxide solution.

Heat in a water bath at 75° C. for 45 minutes, then in boiling water until the volume remaining in the tube is reduced to 1-2 ml.

Transfer the tube contents quantitatively to a 250 ml. separator, and rinse the tube in turn with water, two 2 ml. portions of acetone, and hexane. Add sufficient water to make the total volume of water to about 125 ml., hexane to make its total volume to 50 ml., and 10 ml. of saturated sodium chloride solution. The acetone rinse assures that the tube will be wet by the hexane and, therefore, that no dehydrochlorinated methoxychlor will be lost at this step. However, an excessive volume of acetone must be avoided.

Shake the separator for 1 minute, separate and discard the water layer. Repeat the washing twice more with 125 ml. of water and 10 ml. of saturated salt solution. Shake 0.5 minute with each wash.

Filter the hexane solution through a 20-25 mm. layer of anhydrous sodium sulfate supported on a small pledget of cotton in a filter tube, and collect the filtrate in a suitable container. The type of container which has been found most convenient to facilitate subsequent manipulations is described under "Discussion of the Method." If the newer type separatory funnels, which have a stem of about 8 mm. I.D., are available, a better technique for the above filtration is: Form a tight roll from a 2 cm. wide strip of filter paper (Whatman No. 1), allow the paper to uncoil slightly, and fit the roll snugly into the stem of the separator. This arrangement provides rapid filtration and easy rinsing, yet satisfactorily removes water from the extract.

When the extract has completely drained through the filter, rinse the separator with 10 ml. of hexane, pass this through the filter and collect it in the same container with the balance of the filtrate.

6. Chromatographic Separation

Before undertaking the analysis of unknown samples it is necessary to run one or more samples of blank material similar to the unknowns, with methoxychlor added. Make the extraction and carry through the procedure, including the chromatographic separation described below. Use the same quantities throughout as will be used in running the unknowns. Add to the aliquot of blank extract about 40-50 micrograms of methoxychlor before the first evaporation is completed.

Use adsorption tubes of 1 cm. I.D. These tubes should be designed for application of gas pressure at their tops.

Weigh out 1.5 gm. of a 1:1 (weight) mixture of "Attasol" and "Hyflow Super-Cel." Caution: A sufficient quantity of the adsorbent mixture should be prepared to complete the analysis of an entire batch of samples. It must be kept in a tightly closed container between weighings. Weighed portions should be used promptly to avoid possible adsorption of moisture and resultant diminished activity.

Place a small pledget of cotton in the bottom of an adsorption tube, add and tamp down anhydrous sodium sulfate to a depth of about 2 cm., wet and wash quickly into the tube the weighed portion of the adsorbent mixture, by means of a stream of hexane from a wash-bottle, apply a pressure of about 5-7 p.s.i. (dry air or nitrogen) to the top of the column, when the liquid level approaches the top of the column packing

add anhydrous sodium sulfate to a depth of 1.5-2.0 cm., rinse down with hexane, force the solvent down almost to the top of the packing.

Note: The solvent level must never be permitted to fall below the top of the column packing because the resultant drying of the adsorbent will alter its adsorptive power.

Transfer exactly 5 ml. of the sample extract, the volume of which has been reduced to exactly 6 ml., to the top of the prepared column. To effect the specified concentration, evaporate the sample extract to a volume of 3-4 ml. in a water bath at 40°-45° C., aided by a jet of air, and rinse down the container with sufficient hexane to make the volume to exactly 6 ml.

Force the sample through the column, rinse down twice with 1-2 ml. of solvent; when the second rinse has been forced down to the top of the column packing, add solvent and reapply the gas pressure.

Collect the eluate, starting immediately after transferring the sample aliquot to the column, in two fractions; the first to be discarded, and the second to be retained for completion of the analysis.

The respective volumes of these two fractions are to be determined by running blank samples with added methoxychlor. For this purpose collect the eluate in small separate fractions of 5 ml. each, evaporate to dryness in large test tubes, rinse down with 1 ml. of ethyl ether, and add 5 ml of 85% sulfuric acid. Let stand at least 30 minutes. By observation of the color produced it will then be possible to determine safe limits of the eluate volume which may be expected to contain all of the dehydrochlorinated methoxychlor, and no significant amounts of substances which cause off-colors.

7. Color Development and Reading

Evaporate the retained portion of eluate to dryness in the water bath at 45°-50°C. with the aid of an air jet. Large tubes (about 32 x 150 mm.) are convenient for this evaporation and subsequent mixing with sulfuric acid.

Rinse the tubes down carefully with 1-2 ml. of ethyl ether, evaporate to dryness.

Dissolve the residue in exactaly 1.0 ml. of ethyl ether (the tube must be cool), and immediately add 10 ml. of the 85% sulfuric acid (preferably from an automatic pipet). Mix thoroughly. Let stand for 1-2 hours.

Read the optical density or per cent transmittance of the sulfuric acid solutions on a spectrophotometer or colorimeter at 555 millimicrons. In case a filter colorimeter is used a 550 millimicron filter will be satisfactory.

8. Standard Curve

Set up and run with each batch of samples, standard samples at two or more concentration levels in triplicate, by adding the standard methoxychlor solution to aliquots of an extract of material similar to the samples under examination, but known to be free of methoxychlor. Two aliquots without added methoxychlor should also be run as a check against the possibility of contamination in the blank extract.

The volume of all these aliquots, and the sample weight represented, must be the same as for the unknown samples.

If a large number of samples is to be run, time may be saved by carrying as many samples as can be handled readily through the procedure to the stage at which they are dried down after passage through the columns. In this dry state samples may be held for several days without loss of dehydrochlorinated methoxychlor, and one set of standard samples will thus suffice for a large number of unknown samples, so long as the color development and readings are carried through with the same batch of acid at the same time.

The standard curve may be constructed on any rectangular coordinate paper of convenient dimensions, with optical density plotted against concentration of methoxychlor, if the color values are read as, or converted to, optical-density values. The concentration of methoxychlor found in the samples as read may then be taken directly from the curve, and the concentration of methoxychlor in the original sample material may be calculated.

Assuming that aliquot volumes and sample weights represented are constant, the five-sixths reduction in the samples, which occurs during the course of the procedure, may be ignored, since all samples are treated alike. No blank correction need be applied, for standards and samples are essentially identical except for methoxychlor content.

References

(1) Colorimetric Determination of Small Quantities of 2,2-bis (p-methoxyphenyl) 1,1,1-trichloroethane (Methoxychlor). John D. Fairing and Horace P. Warrington, Jr., Beech-Nut Packing Co., Canajoharie, N. Y.

CSMA 61-34
Determination of Moisture
(Official)

Scope

Insecticidal oil sprays and oil spray concentrates.

Apparatus

(a) Pryex dropping bottle, 3-ml., fitted with a 1 ml. rubber bulb.

(b) Karl Fischer titrimeter, or similar commercial electrometric instrument.

(c) Extraction flasks, 150-ml.

Reagents

(a) Alcohol-water solution, 15 ml. water mixed with 4 liters anhydrous methanol.

(b) Pyridine-sulfur dioxide stock solution, 1 pound sulfur dioxide gas bubbled slowly into 2,270 ml. of Barrett's 2A grade pyridine.

(c) Iodine reagent: To 682 ml. anhydrous methyl alcohol add 300 ml. pyridine-sulfur dioxide stock solution. Then add slowly, 120 gm. iodine c.p. with occasional stirring.

Standardization-secondary

Into a thoroughly dried extraction flask buret about 40 ml. of the iodine reagent. Titrate with the alcohol-water solution to the end point as indicated by the instrument. Calculate the ratio between the strengths of the two solutions (R):

$$R = \frac{\text{milliliter iodine soution}}{\text{milliliter alcohol solution}}$$

Standardization-primary

Fill the dropping pipette with pure water, wipe the outside dry, and carefully insert the pipet into the thoroughly dried dropping bottle without allowing any water to come in contact with the ground glass neck. Weigh the whole assembly to four decimal places. While running iodine reagent into a thoroughly dried extraction flask add three or four drops of water from the dropping pipette, and replace the pipet immediately in the dropping bottle. Continue adding iodine reagent until there is an excess as indicated by the dark color. Then titrate with the alcohol-water solution to the instrument endpoint. Read both burets and reweigh the dropping bottle assembly.

Calculate the factor "F" in terms of gm. of water per ml. of iodine reagent.

$$F = \frac{\text{grams water used}}{\text{milliliters iodine titration} - \text{milliliters alcohol titration} \times R}$$

Procedure

Weigh to one decimal place 15 to 20 gm. of sample, into a thoroughly dried extraction flask. Add an excess of the iodine reagent so that after swirling to completely dissolve the sample, the solution remains dark colored. Then titrate with the alcohol-water solution to the instrument endpoint.

Calculate the percentage water in the sample:

$$\text{Per cent water} = \frac{F\ (\text{milliliters iodine titration} - \text{ml. alcohol titration} \times R) \times 100}{\text{grams sample}}$$

CSMA 61-35
Determination of MGK 264 (N-Octyl Bicycloheptene Dicarboximide)
(Informational)

Scope

The MGK 264 technical. Can be applied to spray concentrates absent from other nitrogen bearing ingredients

Apparatus

Kjeldahl flasks for digestion and distillation

Distillation flasks

See paragraph 2.21, 7th edition, 1950 Official Methods of Analysis of the Association of Agricultural Chemists

Reagents

(a) Benzoic acid, C. P.

(b) Copper sulfate ($CuSo_4 \cdot 5H_2O$)

(c) As in paragraph 2.20, 7th edition, 1950, Official Methods of Analysis, Association of Agricultural Chemists.

Procedure

(1) *Determiation of Nitrogen* — Digest a 2 gram sample of the MGK 264 with 2 grams pure benzoic acid and 40 mls. of concentrated sulfuric acid for 30 minutes. Add 1 gram of copper sulfate, 10 grams sodium sulfate, and 2.5 ml. sulfuric acid. Digest hot for three hours. Proceed as outlined in paragraph 2.24, 7th edition, 1950, Official Methods of the Association of Agricultural Chemists under Wilfarth-Gunning Method.

(2) *Calculation of Results*—Per cent N-octyl bicycloheptene dicarboximide = per cent nitrogen x 20. Per cent technical MGK 264 = per cent nitrogen x 20.2.

CSMA 61-36
Determination of "Phosdrin" Insecticide In Spray Formulations Acid Hydrolysis-Aqueous Hydroxylamine Hydrochloride Method
(Tentative)

Scope

1. This method describes a procedure for the determination of Phosdrin insecticide, a material containing not less than 60%w of the *alpha isomer* of 2-carbomethoxy-1-methylvinyl dimethyl phosphate and not more than 40%w of insecticidally-active related compounds, in solid and liquid agricultural spray formulations. It is not applicable to those formulations in which components other than the toxicant may be hydrolyzed in acid solution to form a ketone; hence, its principal use is in the analysis of formulations during manufacture to determine conformance with specifications (see Note 1).

Method Summary

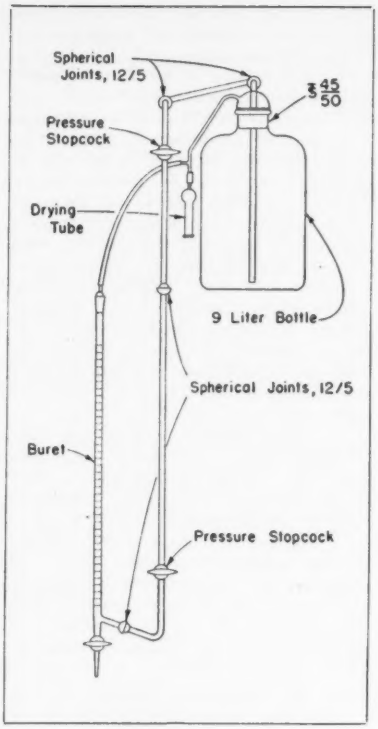
2. (a) The method is based on the acid hydrolysis of the 2-carbomethoxy-1-methylvinyl phosphate (mol wt =224) of the Phosdrin insecticide to split off 1 mole of acetone, and the subsequent reaction between the acetone and hydroxylamine hydrochloride to form 1 equivalent of hydrochloric acid. The hydrochloric acid produced, which is titrated with standard aqueous sodium hydroxide, is a measure of the Phosdrin insecticide in the sample.

(b) The presence of acids, bases and salts which buffer aqueous solutions in the pH range 3.0 to 3.6, and the presence of excessive hydrocarbons necessitate stripping the acetone quantitatively from the Phosdrin insecticide hydrolysis mixture into neutral hydroxylamine reagent.

Warning

3. When testing a highly toxic pesticide such as Phosdrin insecticide, take proper precautions to prevent skin contact and inhalation of the dusts and vapors Whenever possible, work under a hood. Take care to prevent splashing of liquids, billowing of dust, and spillage. Always wear rubber gloves and have adequate face protection; decontaminate all apparatus after use by the procedure given in Section 9.

Note 1. For an infrared method applicable to the determination of the *alpha isomer* in neat Phosdrin insecticide as well as in Phosdrin insecticide in formulations, see CSMA 61-37.



CSMA 61-36—Fig. 1
All Glass Buret System

Apparatus

4. (a) *Buret,* 50-ml capacity, graduated in 0.1-ml subdivisions; precision grade burets meetings the tolerance specifications[1] of NBS Circular C 434 are recommended. A convenient arrangement of a reservoir of Pyrex glass, connected in a manner which allows filling of the buret without exposure to air of carbon dioxide, is desirable (see Fig. 1).

(b) *Weighing Pipet,* Lunge Type. A suitable design is shown in Fig. 2.

(c) *Acetone Stripping Apparatus* consisting of a distillation and receiving apparatus (shown in Fig. 3; standard parts are indicated). Use a –10 to 150°C thermometer with a 10/30 ground joint.

Reagents

5. Unless otherwise indicated, it is intended that all reagents conform to the specifications established by the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available.

(a) *Antifoaming Agent.* Dow-Corning Antifoam A[2], a Silicone defoamer, is satisfactory.

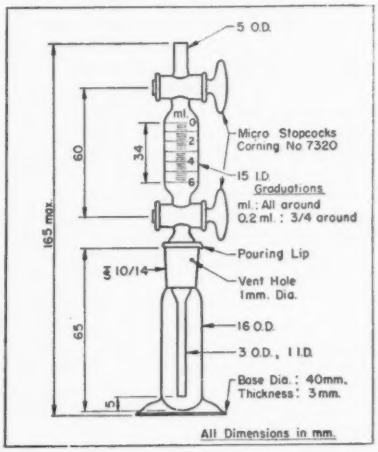
(b) *Bromphenol Blue Indicator Solution.* Dissolve 1 g of bromphenol blue in 1 liter of 99% isopropyl alcohol.

(c) *Hydroxylamine Reagent,* 2.5%w aqueous. Prepare by dissolving 25 g of hydroxylamine hydrochloride in each 1 liter of distilled water.

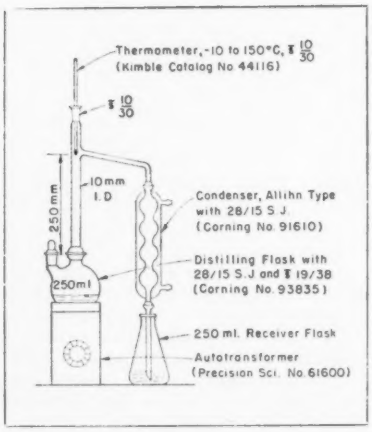
(d) *Sodium Hydroxide Solution,* standard 0.5 N. Prepare by slowly adding 454 g of sodium hydroxide (1-lb bottle) to 450 ml of distilled water in a 1-liter flask. Close the flask with a rubber stopper fitted with a soda-lime guard tube, and allow to stand for several days until precipitation of carbonate ceases. For each liter of 0.5 N solution desired, transfer 26.9 ml of the supernatant syrupy concentrated solution to an alkali-resistant bottle containing the required quantity of freshly boiled distilled water. Provide adequate protection from atmospheric carbon dioxide during the transfer and during the subsequent storage of the finished solution. Standardize against potassium acid phthalate. (see Note 2)

Note 2. For further instructions on the preparation and standardization of sodium hydroxide solutions, see SMS RS-12.

CSMA 61-36—Fig. 2
Lunge Weighing Pipet



CSMA 61-36—Fig. 3
Acetone Stripping Apparatus


Thermometer, -10 to 150°C,
(Kimble Catalog No 44116)
10mm I.D
250 mm
250ml
Condenser, Allihn Type with 28/15 S.J. (Corning No. 91610)
Distilling Flask with 28/15 S.J and 19/38 (Corning No. 93835)
250 ml. Receiver Flask
Autotransformer (Precision Sci. No. 61600)

[1]Kimble Certified Precision (Normax) burets and pipets, manufactured by Kimble Glass Division, Owens-Illinois Glass Company, Toledo 1, Ohio, meet these specifications.

[2]Manufactured by Dow Corning Corporation, Midland, Michigan.

TABLE I—Recommended Sample Sizes

Formulations	*Sample Size*[a] *ml*	*g*	*NaOH Titrant Normality*
Solid[b]			
%w Phosdrin Insecticide			
1	—	25	0.050
2	—	20	0.050
10	—	25	0.50
25	—	10	0.50
Liquid[c]			
Emulsible Concentrate			
(2 lb Phosdrin Insecticide/U.S. gal.)	10	9.51	0.50
Water Soluble Solution			
(2 lb Phosdrin Insecticide/U.S. gal.)	10	8.78	0.50

[a] These sample sizes permit the use of a 250-ml distillation flask and provide for an adequate titer of 15 to 30 ml.

[b] For the range of 1 and 2% Phosdrin insecticide there will be 0.001 to 0.002 moles of the insecticide in the analysis sample, equivalent to 0.001 to 0.002 moles of acetone after acid hydrolysis; hence, the more dilute titrant is used.

[c] The weights of sample indicated are based on specific gravity 60/60°F so that the actual weights taken will depend upon the existing temperature at the time of sampling.

(e) *Sodium Hydroxide Solution*, standard 0.05 N. Prepare by exact dilution of 0.5 N sodium hydroxide solution. Provide adequate protection from atmospheric carbon dioxide during transfer and during storage.

(f) *Sulfuric Acid Solution*, 30%w, aqueous. Prepare by adding 210 ml of concentrated sulfuric acid (sp gr 1.84) to 840 ml of distilled water.

Reaction Factor

6. The reaction factor is composed of two constants, one based on the completeness of hydrolysis of the Phosdrin insecticide and the other on the completeness of the reaction of acetone with hydroxylamine. This factor may be determined for each lot of Phosdrin insecticide used in preparing the formulations as follows; alternatively, the approximate value of 1.022 may be used:

(a) Prepare a solution representative of each batch (common Lot No.) of neat Phosdrin insecticide to be used. Measure by means of a Lunge weighing pipet 2.5 to 3.0 g of the neat insecticide (CAUTION: see Section 3) into the 250-ml distillation flask (Fig. 3). Connect the distilling flask containing sample to the stripping apparatus. Carry out the analysis in triplicate as described in Section 8, making the titration with 0.5 N sodum hydroxide solution.

(b) Calculate the reaction factor of the batch of Phosdrin insecticide by means of the following equation:

$$\textit{Reaction Factor} = \frac{V \times N \times 224}{1000\ W}$$

where:

V = volume, milliliters, of standard sodium hydroxide solution used in the titration, and

N = normality of the standard sodium hydroxide solution.

W = weight of neat Phosdrin insecticide, grams, used for the determination.

Sample

7. Select an amount of sample as given in Table I and transfer to the 250-ml distillation flask (Fig 3). Liquid samples should be weighed by difference in a closed vessel such as a lunge weighing pipet (see Fig 2) or taken by pipet equipped with a rubber bulb pipet filler (CAUTION: see Section 3) observing the gravity of the solution at the time of sampling. After adding the sample, connect the distillation flask to the stripping apparatus.

Procedure

8. (a) Transfer to a 500-ml wide mouth conical flask, 400 to 425 ml of the 2.5%w hydroxylamine reagent and 1 ml of bromphenol blue indicator solution. Titrate this solution with standard sodium hydroxide solution using the normally indicated in Table I for the particular sample being analyzed. Titrate until the color becomes blue-green when observed by reflected diffused light. When the proper blue-green color is obtained, transfer, by means of a pipet, 100±0.1 ml portions of the neutralized solution into each of four 250-ml conical flasks. To one of these add 50 ml of distilled water and retain for an end point reference standard.

(b) Assemble the stripping unit with the distilling flask and thermometer in place; turn on the water to the condenser. Place one of the 250-ml conical flasks containing the 100 ml of neutralized hydrolamine hydrochloride solution under the condenser and clamp the delivery tube to the condenser with the outlet below the solution.

(c) To the sample add, by means of a graduate, 75 ml of 30%w sulfuric acid solution through the sidearm on the distilling flask. Add 1 or 2 boiling chips to prevent "bumping." When analyzing wettable powders, also add about 4 drops of an antifoaming agent.

(d) Heat the sample-sulfuric acid mixture gently and strip the acetone quantitatively into the hydroxylamine reagent. The hydrolysis and distillation should take about 1 hr after a gentle boiling rate has been attained. Acetone removal is essentially complete when the vapor temperature reaches 90°C.

(e) After stripping is complete, remove the receiver and rinse any liquid into the condenser and delivery tube into the receiver with distilled water. Titrate the solution immediately with the same strength of sodium hydroxide solution used in Paragraph a, to a color matching that of the 150-ml references standard. View the color of the two solutions side by side in transmitted diffused light against a white background observing the solutions in a plane parallel to the surface of the liquid.

(f) Allow the titration mixture to stand for 5 min to make certain that the reaction has reached equilibrium. If rapid fading of the end point color is observed, interfering substances are present and the method should be considered inapplicable.

Apparatus Decontamination

9. *Phosdrin Insecticide, Neat or Formulated.* Following each use, allow all contaminated apparatus to soak in a 5%w aqueous sodium hydroxide solution for a period of 2 to 3 hr. Then rinse with copious quantities of water.

Calculation

10. (a) Calculate the Phosdrin insecticide content of the formulation sample by means of the following equation:

$$\textit{Phosdrin Insecticide, \%w} = \frac{V \times N \times E \times F \times 100}{1000\ W}$$

where:

V = volume, milliliters, of the standard sodium hydroxide solution used in the titration,

N = normality of the standard sodium hydroxide solution,

E = equivalent weight of Phosdrin insecticide (which is assumed to be 224, the molecular weight of 2-carbometroxy-1-methylvinyl dimethyl phosphate),

F = reaction factor for the batch of Phosdrin insecticide used, as determined in Section 6 (or use the approximate value of 1.022), and

W = weight of sample, grams.

Precision

11. The following data should be used for judging the acceptability of results (95% probability) according to the SMS statistical concept of precision (see Note 3).

(a) Duplicate results by the same operation should be considered suspect if they differ by more than the following amounts:

Repeatability

1% of mean

(b) Sufficient data are not available for making an estimate of the reproducibility of this method.

Note 3. If the approximate value for the reaction factor is used, the above equation reduces to 22.89 VN/W.

CSMA 61-37
Determination of "Phosdrin" Insecticide In Pesticidal Formulations and Technical Product
Infrared Spectrophotometric Method
(Tentative)

Scope

1. (a) This method describes a procedure for the determination of Phosdrin insecticide, a product containing not less than 60% of the *alpha isomer* of 2-carbomethoxy-1-methylvinyl dimethyl phosphate and not more than 40%w of insecticidally-active related compounds. It is applicable to the analysis of insecticidal dusts, wettable powders, granular formulations which contain Phosdrin insecticide only, and of emulsible concentrates after preliminary treatment to remove hydrocarbon solvents and emulsifiers interfering in the infrared region used for the analysis of the *alpha isomer*.

(b) The method may also be used for the analysis of technical product Phosdrin insecticide (see Note 1).

Method Summary

2. (a) Liquid formulations are treated by means of a chromatographic technic to remove interfering impurities such as hydrocarbons, emulsifiers, etc. Solid formulations are extracted in a chromatographic column to separate the toxicant from the carrier material. Technical product Phosdrin insecticide is dissolved in chloroform directly.

(b) The infrared analysis is based on the absorption of the *alpha isomer* of 2-carbomethoxy-1-methylvinyl dimethyl phosphate at 8.78μ as determined by a base-line technic from the spectrum of the sample in chloroform scanned in the wave length region of 8.59 to 9.03μ. The *alpha isomer* content of the sample is determined by comparison with a previously prepared reference curve.

Warning

3. When testing a highly toxic pesticide such as Phosdrin insecticide, take proper precautions to prevent skin contact and inhalation of the dusts and vapors. Whenever possible, work under a hood. Take care to prevent splashing of liquids, billowing of dust, and spillage. Always wear rubber gloves and have adequate face protection; decontaminate all apparatus after use by the procedure given in Section 11.

Apparatus

4. (a) *Infrared Spectrophotometer,* capable of recording in the region of 8 to 10μ. The slit width and gain must be adjustable to give a satisfactory signal-to-noise ratio and adequate resolution. In general, the minimum slit width given a signal-to-noise ratio of about 100 to 1 is chosen. A sealed absorption cell, with sodium chloride windows, having a path length of about 0.1 mm is required (see Note 2).

Note 1. For an acid hydrolysis-hydroxylamine hydrochloride method, see CSMA 61-36.

(b) *Hypodermic Syringe,* Luer Type, glass, 1.0 ml capacity. Use an 18-gage (Stubbs), 2-inch, slip-on type needle.

(c) *Chromatographic Column,* constructed as shown in Fig. 1.

Reagents

5. Unless otherwise indicated, it is intended that all reagents conform to the specifications established by the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available.

(a) *Chloroform.*

(b) *Adsorbent Clay;* use a diatomaceous earth such as Hi-Flo Super-Cel[1].

(c) *Hexane,* a commercial C_6 petroleum fraction[2], having a boiling range of 65 to 72°C (SMS 356), a paraffin content of at least 98% (SMS 644), and evaporation residue of less than 0.0016%w.

(d) *Magnesium Silicate Adsorbent;* use a synthetic adsorbent consisting of magnesium tri-silicate available as Florisil[3], 60 to 100 mesh.

(e) *Phosdrin Insecticide* whose content of the *alpha isomer* of 2-carbomethoxy-1-methylvinyl dimethyl phosphate is known[4].

Apparatus Calibration

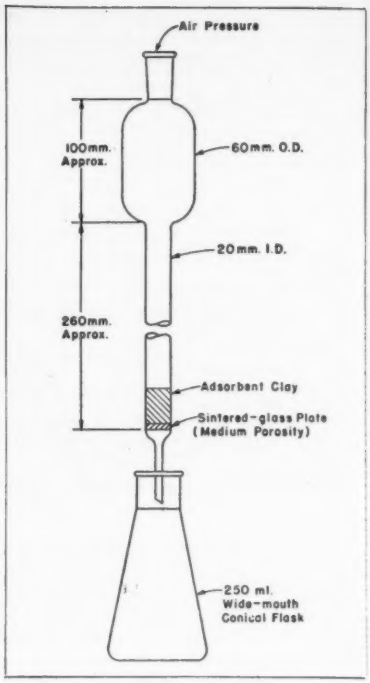
6. (a) Into each of several 10-ml volumetric flasks weigh, to the nearest 0.1 mg, a quantity of the standard sample of Phosdrin insecticide equivalent to 20, 40, 60, 80, 100 and 120 mg of the *alpha isomer* of 2-carbomethoxy-1-methylvinyl dimethyl phosphate. Dissolve in chloroform, dilute to the mark and mix thoroughly. The concentrations of these solutions will therefore be 0.2, 0.4, 0.6, 0.8, 1.0 and 1.2 g/100 ml.

(b) Fill the 0.1-m- cell with the most diulte of the standard Phosdrin insecticide solutions by means of the hypodermic syringe. Adjust the spectrophotometer to the optimum instrument settings with respect to gain, slit width, response, speed, and drum drive. Make duplicate scans of the chloroform solution over the wave length region of 8.59 to about 9.03μ.

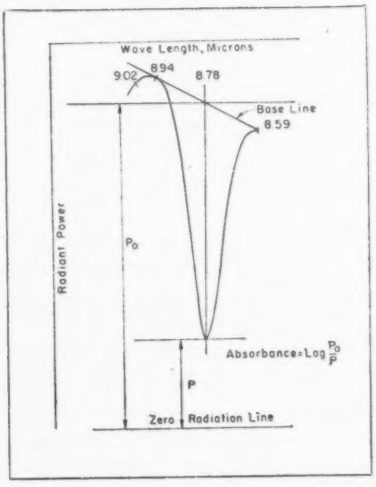
(c) Fill the cell with each of the five remaining solutions of Phosdrin insecticide in turn. Make duplicate scans of each of these solutions over the wave-length region 8.59μ to 9.03μ; use the same instrument settings as in Paragraph b.

(d) For each of the scans of the six line from the point on the curve at 8.59μ and tangent to the base of the absorbance peak in the region of 8.94μ.

Note 2. The infrared spectrophotometric method presented here assumes an adequate knowledge of the technics and calculations used in infrared spectroscopy; practical considerations do not permit a comprehensive presentation of all phases of the operation of such instruments and the calculation of results obtained therefrom. The method as outlined is for use with a recording infrared spectrophotometer, Perkin-Elmer Model 12C[5]; however, the method is suitable for use with any infrared instrument capable of measuring absorbance at the wave-lengths specified.



CSMA 61-37—Fig. 1
Chromatographic Column



CSMA 61-37—Fig. 2
Base Line Method

[1]Manufactured by Johns-Manville Company, 22 East Fortieth Street, New York 16, New York.

[2]A satisfactory solvent is manufactured by the Skelly Oil Company, Tulsa, Oklahoma, under the trade name "Skellysolve B."

[3]Available from the Floridin Company, Tallahassee, Florida.

[4]A standard sample of Phosdrin insecticide whose *alpha isomer* content is known and suitable for use as a photometric standard is available upon request from Agricultural Chemicals Division, Shell Chemical Corporation, 460 Park Avenue, New York 22, New York.

[5]Manufactured by Perkin-Elmer Corporation, Norwalk, Connecticut.

Draw a perpendicular from the zero radiation line through the absorbance peak (see Fig. 2) and measure the radiant power (P_o and P); the distances may be measured in any convenient unit, but always in the same units. Calculate absorbance as the logarithm of the ratio of the incident radiant power (P_o in Fig. 2) to the transmitted radiant power (P in Fig. 2).

(e) Make a plot of the absorbances as ordinates against the concentrations, grams per 100 ml, as abscissa, of the six calibrating solutions. Because of the method of choosing the base line, the calibration curve intersects the abscissa at a positive concentration value. Thus, the method is not applicable at concentrations below this value.

Sample Preparation

7. *Solid Formulations*

(a) Prepare a chromatographic column by adding sufficient adsorbent clay (Hy-Flow Super-Cel) to make a layer 2 inches high when gently packed. Place a 500-ml wide-mouth conical flask under the column outlet. Weigh a sample expected to contain 0.5 to 1.0 g of Phosdrin insecticide and transfer it to the chromatographic column.

(b) Working in a well-ventilated hood, add a 50-ml portion of chloroform to the column. Using a stirring device, vigorously agitate the sample and the top half of the adsorbent clay layer, forming a slurry with the solvent. Withdraw the stirring device, and rinse it and the column walls with additional chloroform from a wash bottle.

(c) Allow the chloroform to percolate through the column, using dry air or nitrogen at 2 to 5 psi pressure, if necessary, to maintain a flow rate of 5 ml/min. When the height of the solvent above the absorbent clay layer has diminished to 2 to 3 mm, rinse the column with three successive 10- to 20-ml portions of chloroform, allowing each portion to just enter the clay layer before adding the next. Finally, add 50 to 75 ml of chloroform to the column, and collect the eluent until the last of the supernatant solvent just enters the clay layer. Rinse the tip of the column with chloroform to recover any toxicant that may have deposited on it.

(d) Place the conical flask on a steam bath and evaporate the contents to a volume of about 75 to 80 ml (see Note 3). Remove the flask and transfer the contents to a 100-ml volumetric flask, washing the flask with two or three 5-ml portions of chloroform; dilute to the mark after the sample has cooled to the temperature of the room in which the spectrophotometer is located. Determine the toxicant concentration by the infrared procedure described in Section 10 (see Note 3).

8. *Liquid Formulations*

(a) Place 40 g of magnesium silicate adsorbent (Florisil) in a 200-ml beaker, add about 100 ml of hexane and mix thoroughly. Transfer the resulting slurry to the chromatographic column, employing a stream of hexane from a wash bottle to effect the transfer. If bubbles or voids occur in the resulting column of adsorbent, eliminate them by vibration or agitation. Allow the hexane to drain through the column until only a 2- to 3-mm layer remains above the surface of the adsorbent.

(b) Introduce the liquid sample, containing 0.5 to 1.0 g of Phosdrin insecticide, diluted with an equal volume of hexane, into the prepared column. Rinse the walls of the column with three 10-ml portions of hexane which contains 2%v chloroform, allowing each portion to enter the adsorbent layer before adding the next. Add about 150 to 200 ml of this solvent and allow it to percolate through the column (see Note 4); discard the entire eluent.

(c) Add 10 ml of chloroform which contains 1.5%v acetone to the column, allowing it to flow gently down the walls of the tube to avoid disturbing the surface of the adsorbent. After this volume has entered the adsorbent layer, repeat twice more with 10-ml increments. Finally, add 200 to 250 ml of chloroform-acetone solvent and allow the eluent to flow at a rate of 2 to 5 ml/min. Collect this entire fraction in a clean 500-ml wide-mouth conical flask.

(d) Place the flask on a steam bath and evaporate the contents to a volume of about 75 to 80 ml (see Note 3). Remove the flask and transfer the contents to a 100-ml volumetric flask, washing the flask with two or three 5-ml portions of chloroform; dilute to the mark after the sample has cooled to the temperature of the room in which the spectrophotometer is located. Determine the toxicant concentration by the infrared procedure described in Section 10.

9. *Technical Product*

(a) Weigh, to the nearest 0.1 mg, from a weighing pipet about 0.1 g of sample into a 10-ml volumetric flask. Dissolve the sample in chloroform and dilute to the mark.

(b) Determine the toxicant concentration by the infrared procedure described in Section 10.

Procedure

10. Fill the 0.1-mm cell of the infrared spectrophotometer with the sample solution. Make duplicate scans of the chloroform solution of sample in the region of 8.59 to about 9.03μ, with the settings as used in Section 6; use the same 0.1-mm cell as used for the calibrations. Calculate the absorbance for each of the scans as described in Section 6d and then compute the mean absorbance.

Apparatus Decontamination

11. Following each use, soak all contaminated apparatus in a 5%w aqueous sodium hydroxide solution for 2 to 3 hr. Then, rinse with copious quantities of water.

Calculation

12. (a) From the computed mean absorbance, read from the calibration curve the weight of the *alpha isomer* of 2-carbomethoxy-1-methylvinyl dimethyl phosphate, in grams, in 100 ml of the sample solution.

(b) Calculate the Phosdrin insecticide content of formulations by means of the following equation:

$$\textit{Phosdrin Insecticide, } \%w = \frac{W \times V \times 1.667}{S} \times 100 = \frac{(16670)(W)}{S}$$

where:

W = weight of *alpha isomer*, grams/100 ml, as read from the calibration curve,

V = volume, milliliters, of sample solution, and

S = weight of sample, grams.

(see Note 5).

(c) Calculate the *alpha isomer* content of 2-carbomethoxyl-1-methylvinyl dimethyl phosphate in technical product Phosdrin insecticide by means of the following equation:

$$\textit{Alpha Isomer, } \%w = \frac{W \times V}{S} = \frac{10C}{S}$$

where:

W = concentration of *alpha isomer*, grams/100 ml solvent as read from the calibration curve,

V = volume, milliliters, of sample solution, and

S = weight of sample, grams.

Precision

13. The following data should be used for judging the acceptability of results (95% probability) according to the SMS statistical concept of precision.

(a) Duplicate results by the same operator should be considered suspect if they differ by more than the following:

Formulations	
Liquid (Note 6)	7.5% of the mean
Solid	3% of the mean
Alpha Isomer in Phosdrin Insecticide	0.9%w

Note 3. It may prove advantageous to evaporate the excess chloroform with a stream of nitrogen or to remove the excess chloroform to the desired concentration by vacuum distillation.

Note 4. Do not allow the column to become dry, since shrinkage and contraction of the adsorbent is likely to occur, resulting in channeling and poor recovery of the toxicant.

Note 5. The factor 1.667 is used to relate the Phosdrin insecticide content to the amount of the *alpha isomer* found.

Note 6. Sufficient data has not yet been developed to permit an accurate estimate of the repeatability of the chromatographic clean-up procedure for liquid formulations, since only a small segment of possible formulations are available for analysis at the same time.

(b) Sufficient data are not available for making an estimate of the reproducibility of this method.

CSMA 61-38
Colorimetric Determination of Parathion or Methyl Parathion In Dust and Wettable Powder Formulations
(Tentative)

Scope

1. This method describes a procedure for the colorimetric determination of Parathion or Methyl Parathion in dusts and wettable powder formulations.

Summary of the Method

2. The parathion or methyl parathion is extracted with alcohol and hydrolyzed with potassium hydroxide solution to potassium p-nitrophenate, which is determined colorimetrically. A spectrophtoometer is recommended, through a photoelectric colorimeter with a filter to give maximum transmittance between 400 and 450 mμ may also be used. The yellow color of p-nitrophenate is quite stable.

Reagents

3. (a) Ethyl alcohol, 50%.
(b) Potassium hydroxide, 1N in 50% alcohol.
(c) Standard p-nitrophenol solution.

Weigh 60 mg p-nitrophenol (reagent grade), transfer to a 100 ml volumetric flask, dissolve in alcohol and make to volume. Pipet 10 ml into a second 100 ml volumetric flask and make to volume with alcohol. Pipet 5 ml into a third 100 ml volumetric flask, add 5 ml potassium hydroxide 1N (b) with a pipet, and make to volume with 50% alcohol (a).

Determination

4. Weigh a sample containing about 10 mg of parathion (Note 1) and transfer to a 250 ml glass-stoppered flask. Add 100 ml alcohol with a pipet and shake periodically for ten minutes. Filter about 25 ml of this solution into a glass-stoppered container.

Free p-nitrophenol: Pipet 10 ml of the filtered solution into a 100 ml volumetric flask and dilute to volume with 50% alcohol. Add 5 drops of 1N potassium hydroxide (b), mix and IMMEDIATELY measure the absorbance (An) at 405mμ (within two minutes). Use 50% alcohol as blank.

Parathion or methyl parathion: Pipet 5 ml of the filtered solution into a 125 ml standard-tapered flask, add with a pipet 5 ml of 1N potassium hydroxide (b), and add glass beads to prevent bumping. Reflux for at least 30 minutes. Cool, and transfer to a 100 ml volumetric flask with 50% alcohol. Dilute to volume with 50% alcohol and measure the absorbance (A) at 405 mμ in 1 cm Corex cuvettes, using 50% alcohol as blank. Determine the absorbance (A_s) of the standard p-nitrophenol solution (c) in the same manner.

Calculation

5. A = Absorbance of sample solution
An = Asorbance due to free p-nitrophenol
As = Absorbance of standard solution (c)
W = Weight sample
Ws = Weight p-nitrophenol standard = 0.060 x 5/1000 (in 100 ml solution

(see Note 1).

Factors

$$\% \text{ Parathion} \times 0.478 = \% \text{ p-nitrophenol}$$

$$\% \text{ Methyl parathion} \times 0.524 = \% \text{ p-nitrophenol}$$

$$\% \text{ Free p-nitrophenol} = \frac{A_n W_s (100)}{A_s W (10/100)}$$

$$\% \text{ (Uncorrected) parathion} = \frac{A W_s (100)}{A_s W (5/00) (.478)}$$

$$\% \text{ Parathion} = \% \text{ (Uncorrected) parathion} = \frac{1}{.478} (\% \text{ of free p-nitrophenol})$$

References

6. (A) Method submitted by R. A. Montcrief, Chief, Pesticide Section of the Department of Agriculture, State of Georgia, and Chairman, Collaborative Check Sample Series.
(B) J. A. A. Ketelaar and J. E. Hellingman, Anal. Chem. *23*, 646 (1951).

CSMA 61-39
An Ultraviolet Spectrophotometric Method of Assay For Sulfoxide
(Tentative)

Scope

Sulfoxide is analyzed by the intensity of ultraviolet absorption at 287-289 mμ.

Procedure

The following assay procedure has been adopted in this laboratory:—

Weigh out approximately 0.7 grams of sulfoxide into a large test tube (approximately 20 cm long and 3 cm in diameter) to the nearest 0.2 mg. using a weighing pipette. Steam distill the sample cautiously, adjusting the output of the steam generator and the heat under the distillation test tube to maintain the volume between 15-25 ml. The total time of distillation should be between 2 and 3 hours.

Transfer and dilute the contents of the distillation test tube quantitatively in a 250 ml. volumetric flask with USP 95% alcohol. Dilute a 2 ml. aliquot of this solution to 100 ml. The small amount of water introduced into the final dilution has no significant effect on the density reading.

The absorbance of the solution is read in a Model DU Beckman Spectrophotometer using 1 cm. quartz cells at the wave-lengths of maximum absorption between 287-289 millimicrons. The percent of sulfoxide is obtained from the following expression:—

$$\frac{\text{Absorbance}}{123.5} \times \frac{250}{2} \times \frac{100}{\text{g. of sample}}$$

which may be simplified to:—

$$\frac{\text{Absorbance}}{\text{Grams}} \times 101.2 = \% \text{ Sulfoxide}$$

The presence of pyrethrins, allethrin, DDT, methylated naphthalene, pine oil and deodorized kersosene in the amounts used in practical insecticide formulations does not interfere in this method of assay.

Note 1. The sample should contain about 10 mg parathion (or methyl parathion) If necessary, extract a larger sample and aliquot again before the determinations, using alcohol as the solvent.

CSMA 61-40
Colorimetric Determination of Piperonyl Butoxide
(Tentative)

Scope

1. This method describes a procedure for the colorimetric determination of Piperonyl Butoxide.

Objective

2. Piperonyl butoxide is (3,4-methylenedioxy-6-propylbenzyl) (butyl diethylene glycol) ether. The technical product contains a minimum of 80% of this compound; the remainder being related materials of comparable insecticidal activity. Being a synergist for pyrethrins and allethrin, it is generally used in combination with these materials in formulations.

The colorimetric method developed by Jones, Ackermann and Webster (1) determines piperonyl butoxide in the technical product, in aerosol and emulsifiable concentrates, oil base sprays, wettable powders and dusts.

Apparatus

3. Beakers, 250 ml.
Funnel, Buchner, fritted disc, fine porosity
Flask, filtering, 500 ml.
Mechanical stirrer
Filter paper, Whatman No. 1
Funnel, long stem
Funnel, dropping, graduated (250 ml.)
Flask, three-neck, round bottom (1 L.)
Vacuum oven
Analytical balance
Graduated cylinder (100 ml)
Burette (50 ml.)
Flasks, volumetric (100 and 200 ml.)
Pipettes (1 ml. graduated in 0.1 ml., 10 ml.)
Hypodermic syringe and needle (5 ml.)
Test-tubes (150 x 16 mm.)

Test-tube basket (to fit water bath)
Water bath
Stopwatch
Photoelectric colorimeter (Klett-Summerson or equivalent)
Special interference filter with maximum transmission at 630 millimicrons, Bausch and Lomb Optical Company, Catalogue No. 33-78-63.

Reagents

4. (A) Tannic acid. The tannic acid must be specially purified as follows:—To 20 grams of tannic acid, reagent grade, add 100 ml. of ethyl acetate 99%, and agitate the mixture with a mechanical stirrer for about 1 hour. Filter by suction through a sintered glass funnel and wash the residue on the filter with three 5 ml. portions of ethyl acetate. To the combined filtrate and washings, add 2 grams of Darco G-60 and agitate with a mechanical stirrer for ½ hour. Filter by gravity through a double thickness of Whatman No. 1 filter paper into a graduated dropping funnel. Wash the residue several times with ethyl acetate until the volume of the filtrate and washings is about 125 ml. Place the dropping funnel over a 1 liter, three neck, round bottom flask equipped with a mechanical stirrer, and with vigorous agitation in the flask, add the filtrate drop-wise to 5 times its volume of dry toluene. The purified tannic acid is precipitated immediately in the toluene. Filter by suction through a sintered glass funnel and wash the product thoroughly with dry toluene, stirring the solids and toluene to assure complete removal of ethyl acetate. Continue the suction until practically all the toluene has been removed. Dry this purified tannic acid in a vacuum oven at about 40° C and place in a tightly stoppered bottle, in the dark.

(B) Acetic acid, glacial, reagent grade.

(C) Phosphoric acid, 85%, reagent grade.

(D) Deodorized base oil, or kerosene (Deobase, Ultrasene, or equivalent).

(E) Color reagent. Completely dissolve exactly 0.025 grams of specially purified tannic acid in 20 ml. of glacial acetic acid by shaking at room temperature. When the tannic acid is all in solution, add 80 ml of 85% phosphoric acid and mix the solution thoroughly. Prepare fresh daily and keep tightly stoppered since it is hygroscopic.

(F) Purified piperonyl butoxide. This standard material must have a purity as close to 100% as is feasible. The purification is best accomplished by fractional distillation at 1-2 mm pressure, of the technical product.

Procedure

5. (A) Prepare a solution of the sample in deodorized kerosene to contain 25 to 75 micrograms of piperonyl butoxide per 0.1 ml. of solution. For most samples, this is conveniently done by weighing exactly 1.000 gram of sample in a 100 ml. volumetric flask, diluting to the mark with deodorized kerosene and mixing well. 10 ml. of this solution is then pipetted into a 200 ml. volumetric flask, made up to the mark with deodorized kerosene and mixed well. These quantities are not suitable for all samples, however, and it will be necessary to adjust the sample size.

At the same time prepare an appropriate standard. For reasons given below, the standard should closely resemble the sample in composition. The following standards will serve for most of the samples encountered. All standards should be stored in amber bottles.

a. *Pure standard.* Weigh exactly 1,000 gram of specially purified piperonyl butoxide in a 100 ml. volumetric flask. A hypodermic syringe and needle are convenient for adding the sample to the flask during the weighing. Dilute to the mark with deodorized kerosene and mix well. Pipette 10 ml. of this solution into a 200 ml. volumetric flask. Dilute to the mark with deodorized kerosene and mix well. This solution contains 50 micrograms of piperonyl butoxide per 0.1 ml. and will be stable for one year.

b. *10-1 standard.* Weigh exactly 1,000 gram of specially purified piperonyl butoxide in a 100 ml. volumetric flask. Dilute to the mark with deodorized kerosene and mix well. Weigh sufficient standardization pyrethrum extract in a second 100 ml. volumetric flask to give exactly 1,.000 gram of pyrethrins. Dilute to the mark with deodorized kerosene and mix well. Then mix 5 ml. of the piperonyl butoxide solution and 0.5 ml. of the pyrethrins solution and make up to 100 ml. with deodorized kerosene. This solution contains 50 micrograms of piperonyl butoxide and 5 micrograms of pyrethrins per 0.1 ml. Do not store this solution for more than ne month.

c. *5-1 standard.* Using the same solutions prepared for the 10 1 standard, mix 5 ml. of the piperonyl butoxide solution and 1 ml. of the pyrethrins solution and make up to 100 ml. with deodorized kerosene. This solution contains 50 micrograms of piperonyl butoxide and 10 micrograms of pyrethrins per 0.1 ml. Do not store this solution for more than one month.

d. *2,5-1 standard.* Using the same solutions prepared for the 10 1 standard, mix 5 ml. of the piperonyl butoxide solution and 2 ml. of the pyrethrins solution and make up to 100 ml. with deodorized kerosene. This solution contains 50 micrograms of piperonyl butoxide and 20 micrograms of pyrethrins per 0.1 ml. Do not store this solution for more than one month.

c. *Other standards.* Similarily by using the same solutions prepared for the 10-1 standard, standards for other ratios of piperonyl butoxide to pyrethrins can be prepared by mixing 5 ml. of the piperonyl butoxide solution with the appropriate volume of pyrethrins solution.

(B) Carefully pipette exactly 0.1 ml. of the solution of the sample to be tested into a clean test tube, size 150 x 15 mm. Do this in duplicate.

(C) Carefully pipette exactly 0.1 ml. of the solution of the appropriate standard into a third test tube.

(D) Carefully pipette exactly 0.1 ml. of deodorized kerosene into a fourth test tube.

(E) Add exactly 5 ml. of the color reagent to each of the test tubes.

(F) Shake the tubes vigorously for 1 minute.

(G) Place all the test tubes in a test tube basket and put the basket in a vigorously boiling water bath for exactly 5 minutes. The blue color develops at this time. At the end of 5 minutes in the bath, remove the basket and immediately transfer the contents of the test tubes to Klett tubes in an open rack so that there will be adequate ventilation to cool the tubes quickly. Allow the solutions to cool to room temperature. When cool there is no appreciable change in color value for several hours. Let stand one-half hour.

(H) Using an interference filter with maximum transmission at 630 millimicrons, and a distilled water zero setting, take color readings of all of the tubes in the Klett-Summerson Colorimeter. Take several readings for each tube, to be certain of having a good average reading.

(I) Apply the proper corrections for the colorimeter tubes.

(J) Calculations:

a. Subtract the corrected reading for the kerosene blank from the corrected readings of both the sample and the standard.

b. Determine the concentration (C_u) of pure piperonyl butoxide in the diluted unknown sample from:

$$\frac{U}{S} \times C_s = C_u$$

Where:

C_s = Concentration in micrograms per 0.1 ml. of pure piperonyl butoxide in the standard used.
U = Average corrected colorimeter reading for the unknown sample, minus the blank reading.
S = Average corrected colorimeter reading for the standard, minus the blank reading.
C_u = Concentration, in micrograms per 0.1 ml., of pure piperonyl butoxide in the diluted unknown sample.

c. Determine the percentage of pure piperonyl butoxide in the unknown sample from:

$$\frac{C_u}{W} \times 100 = P$$

Where:

W = Concentration of unknown sample used for color test, in micrograms per 0.1 ml.
P = Pure piperonyl butoxide, weight percent, in the unknown sample.

Notes Concerning Standards

5. Since some substances interfere with the development of the color, the

standard should approximate the sample in composition. Pyrethrins and allethrins interfere and where, for example, the ratio of pyrethrins to piperonyl butoxide is known, it is recommended that pyrethrins be incorporated, at that same ratio in the standard.

Chlorinated toxicants in themselves do not interfere, but may require certain solvents (Alkylated naphthalenes, etc.) in formulations which do interfere. Whenever the nature and proportions of these interfering substances are known, adjustments should be made. incorporating the interfering material in the standard, in the same proportions as in the sample.

Reference

6. Jones, H. A., Ackerman, J. H, and Webster, M. E., "Colorimetric Determination of Piperonyl Butoxide" J.A.O.A.C. *35*, 771-780 (1952).

CSMA 61-41
Determination of Pyrethrin I and Pyrethrin II in Pyrethrum Powder and Pyrethrum Extracts in Mineral Oil
(Official)

Scope

1. This method describes a procedure for the determiation of Pyrethrin I and Pyrethrin II by the Mercury Reduction Method.

Procedure

2. CSMA 61-41 is identical with the method of determination of Pyrethrin I and Pyrethrin II in Pyrethrum Powder and Pyrethrum Extracts in Mineral Oil described in Official Methods of analysis of the Association of Official Agricultural Chemists; Eighth Edition; 1955; pages 68, 69 and 70; paragraph 5.111, 5.112, 5.113, 5.114, and 5.115.

CSMA 61-42
A Colorimetric Determination for Pyrethroids
(Informational)

Scope

The red color produced by reacting Pyrethrins I, Allethrin, Barthrin and Dimethyl benzyl Chrysanthemumates with Mercury Oxide reagent is instrumentally measured. Pyrethrin II does not interfere.

Apparatus

Klett - Simmerson Photoelectric Colorimeter with adapter for 10 ml. test tubes and Number 54 filter (520-580 mu)

Matched Test Tubes 10 ml. cap.

Centrifuge.

Reagents

Yellow mercuric oxide: Reagent grade.

Sulfuric acid; 95% minimum.

Deodorized kerosene: Deobase or equivalent.

Color reagent: Mix 0.7 grams mercuric oxide with 80 ml. distilled water. With stirring in a cold water bath slowly add 46 ml. concentrated sulfuric acid and stir until disssolved.

Pyrethrins: A standardized pyrethrum extract, preferably from same lot of material as in sample to be tested.

Standard solution: Make a known sample from the lots of raw material used in the production of the formulation to be tested. Accurately weigh a sufficient amount of this material into a 100 ml. volumetric flask so that when brought to the mark with deobase 1 ml. of this solution will contain 100 micrograms Pyrethrin I. If original standard is highly concentrated make standard by a primary and secondary dilution.

Procedure

Prepare a deobase dilution of the solution to be tested to be the same as that of the standard.

Accurately pipette .5 of the diluted sample into a 10 ml. tube of the Klett-Summerson colorimeter. Rapidly pipette 5 ml. of the color reagent into the tube, stopper, shake vigorously to insure contact with the reagent, and centrifuge for 1-2 minutes to remove air bubbles. Place tube in the Klett-Summerson with a No. 54 filter and record maximum reading which should be attained in about 5 minutes.) (The color produced will fade after having reached a peak intensity.) Compare reading directly to that of an equal aliquot of the standard. On the Klett scale the comparison will be a direct percentage.

The zero point of the scale should be established with the color reagent.

The reaction should be carried out in subdued light. Sunlight will destroy the reaction.

Discussion

The basis for the reaction is a reddish color produced by the reaction of the color reagent with Pyrethrins I. Pyrethrins II does not produce this color reaction which makes it important to have pyrethrins used in the standard from the same source as in the material to be tested. However, many samples have given good checks even though the pyrethrin source was unknown.

The operator should stay with the color reaction until it has reached its peak intensity because the peak color is stable for only a short time after which it fades. Also, if the sample is run simultaneously with the standard the peak color will be reached simultaneously so that a relatively rapid change-over is necessary. The samples should be protected from the effects of sunlight.

Petroleum ether dilutions can be used, but this would necessitate the removal by evaporation of the petroleum ether before the addition of the reagent as the petroleum ether will tend to haze the reaction. However, the use of petroleum ether would eliminate most of the oil and allow easier contact of the reagent with the sample.

The same type procedure can be applied to Allethrin, Barthrin and the Dimethylbenzyl chrysanthemumates. In these cases is is desirable to have the final aliquot of the sample contain from 50-100 micrograms of the active ingredient. The volume of the aliquot should be about 1 ml or less. Greater accuracy will be obtained if the standard can be made from the same type of ingredients as in the sample to be tested. Naturally a blend of or the presence of more than one of these ingredients will interfere. If the blend is known the standard can be made likewise.

Pine oil and acetone interfere in the reaction. Oils with high aromatic content will also interfere.

The method can be applied to dusts. Some types of dusts do not elute completely with petroleum ether, but all that have been tried here eluted quantitatively with n-butanol. The butanol does not interfere and thus does not need to be removed from the aliquot sample. In this case n-butanol would replace the deobase as used in the paragraphs on Reagents and Procedure.

CSMA 61-43
Estimation of Pyrethrins
(Obsolete)

Scope

This method is the "classic" for pyrethrin analysis and has been superceded by CSMA 60-41

Methrod I. Determination of Pyrethrins in Pyrethrum Flowers

(1) Place 12.5 g. of finely ground pyrethrum flowers (minimum 90% through 40 mesh) into an extraction thimble. Cover the sample with a cotton plug previously washed with petroleum ether.* Extract with petroleum ether in a Soxhlet extractor. After extraction is complete (usually 6-8 hours), evaporate the petroleum ether to a volume of approximately 40 ml., stopper the flask, and place it in a refrigerator at a temperature of 0 to 5 degrees C. for at least two hours (preferably overnight).

(2) Filter the cold extract through a small piece of cotton, previously wetted with cold petroleum ether, placed in the stem of a glass funnel and collect the filtrate in a 250 ml. Erlenmeyer flask. Add 20 ml. of *chilled* petroleum ether to the extraction flask. With the aid of a rubber policeman, dislodge the resinous material in the flask, swirl the contents without allowing the wash liquid to warm up appreciably, and filter through the cotton. Repeat the operation twice using 10 ml. portions of chilled petroleum ether.

(3) Add several glass beads and remove the solvent on a water bath, without attempting to heat the residue long enough to remove the last traces of solvent.

(4) Add 15 ml. of 0.5 N ethyl alcoholic NaOH to the residue and reflux for one hour. Transfer the solution to a one liter beaker, wash the flask with two 25 ml. portions of distilled water. Add 1 ml. of deodorized kerosene.

(5) Dilute the sample with distilled water to a total volume of approximately 200 ml. Add a few glass beads and boil until the volume is reduced to approximately 150 ml. Add 1 g. of filter-cel and transfer the mixture quantitatively to a 250 ml. volu-

*Place a piece of glass rod under the thimble to assist in rapid extraction.

metric flask. Add 10 ml. of 10% barium chloride solution, dilute with distilled water to volume, and mix thoroughly. Filter through a fluted filter paper.

(6) Measure exactly 200 ml. of filtrate and transfer quantitatively to a 500 ml. Erlenmeyer flask. Add one drop of phenolphthalein, neutralize with 1.0 N sulfuric acid and add 1 ml. of the sulfuric acid in excess. Distil with steam, using apparatus illustrated, until the volume remaining in the flask is approximately 20 ml. The volume of distillate should be 250 to 350 ml.

Reagents

Petroleum Ether — light boiling (b.p. 20° to 40°C. at altitude where is is used.)
Phenolphthalein Test Solution
Sodium Hydroxide—0.02 N solution, standardized daily
Alcoholic Sodium Hydroxide—0.5 N Ethyl Alcoholic Solution.
Ether—U.S.P. Grade
Sulfuric Acid—1.0 N Solution

(7) To the separatory funnel add 50 ml. of neutral petroleum ether then shake thoroughly for one minute.** After the liquids have separated, draw off the aqueous layer into a second 500 ml. separatory funnel to which a second 50 ml. of neutral petroleum ether has been added. Shake for one minute and after the liquids have separated discard the aqueous layer. Wash the petroleum ether in the first separatory funnel by shaking with 10 ml. of water using the same wash water for the petroleum ether in the second funnel.

Repeat with a second wash water of 10 ml. as before. Combine the petroleum ether extracts in the first separatory funnel. Neutralize 15 ml. of water contining 1 drop of phenolphthalein indicator solution with 0.02 N NaOH and add it to the combined petroleum ether solutions, then titrate with 0.02 N NaOH, shaking after each addition, until the aqueous layer is just pink. Each ml. of 0.02 N NaOH consumed is equal to 0.0066 g. of Pyrethrin I. The 200 ml. aliquot taken corresponds to 10 g. of sample. Therefore the number of ml. consumed times $0.0066 \times \frac{100}{10}$ gives the percentage of Pyrethrin I.

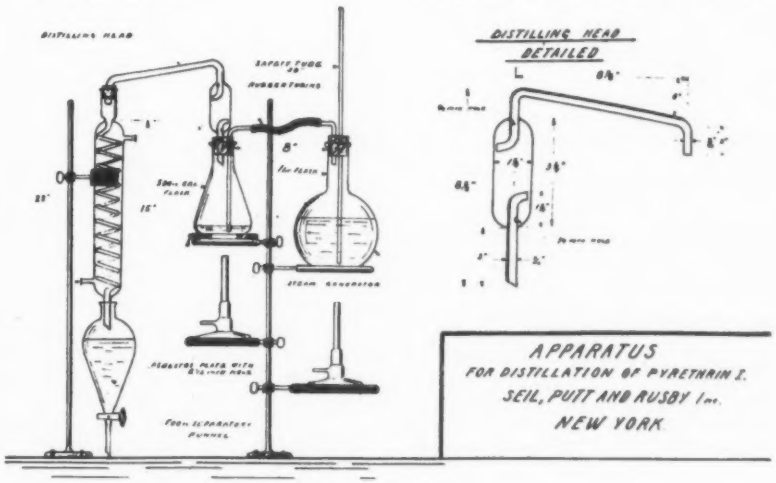
(8) Cool the flask containing the residue from the steam distillation and filter the solution through a Gooch crucible. Wash the flask with three 10 ml. portions of water and use these successively to wash the Gooch crucible. Transfer quantitatively to a pear shaped 500 ml. (Squibb) separatory funnel. Add 5 ml. of concentrated hydrochloric acid and saturate with sodium chloride to excess. Extract the mixture by shaking thoroughly for one minute with 50 ml. of ethyl ether. Draw off the aqueous layer into a second separatory funnel and extract again with 50 ml. of ethyl ether. Continue this extraction and drawing off of aqueous layer using 25 ml. of ethyl ether for the third and fourth extractions. Wash the ether extracts by shaking successively with exactly 10 ml. of distilled water, and repeat with a second successive wash using exactly 10 ml. of distilled water.

(9) Combine the ether solutions, draw off any water that separates and filter through a plug of cotton, previously wetted with ether, into a 250 ml. extraction of Erlenmeyer flask. Wash the separatory funnel and cotton with 10 ml. of fresh ether.

Evaporate the ether on a water bath and dry the residue at 100° C. for 10 minutes. Blow gently into flask twice during the period to facilitate removal of vapors. Add 30 ml. of distilled water, boil to dissolve the residue and cool. Add a drop of phenolphthalein indicator and titrate with 0.02 N NaOH. Each ml. of 0.02 N NaOH consumed is equivalent to 0.00374 g. of pyrethrin II. The 200 ml. aliquot taken corresponds to 10 g. of sample. Therefor the number of ml. consumed times $0.00374 \times \frac{100}{10}$ gives the percentage of pyrethrin II.

Method II. Determination of Pyrethrins in Mineral Oil Spray

(10) For flysprays not containing perfumes or other products which saponify to produce interfering organic acids, reflux 100 ml. of the spray with 15 ml. of 0.5 N ethyl alcohol NaOH for two hours. Cool and transfer to a 500 ml. separatory funnel. Add 85 ml. of water, shake, and withdraw lower layer into a liter beaker. Shake the kerosene with four successive 25 ml. portions of water. Combine the washings and proceed as in paragraph (5) et. seq. The 200 ml. aliquot taken corresponds to 80 ml. of sample. Therefore the number of ml. of 0.02 N NaOH consumed in paragraph (7) times $0.0066 \times \frac{100}{80}$ gives the grams of pyrethrin I per 100 ml. of spray. Similarly the number of ml. of 0.02 N NaOH consumed in paragraph (9) times $0.00374 \times \frac{100}{80}$ gives the grams of pyrethrin II per 100 ml.



Method III. Determination of Pyrethrins in Extracts Containing Approximately 2% of Pyrethrins

(11) Pipette a 10 ml. sample of the extract, allowing the pipette to drain five minutes. Reflux with 15 ml. of 0.5 N ethyl alcoholic NaOH for two hours. Cool, transfer to a liter beaker, and continue as in paragraph (5) et seq. The 200 ml. aliquot taken corresponds to 8 ml. of sample. Therefore the number of ml. of 0.02 N NaOH consumed in paragraph (7) times $0.0066 \times \frac{100}{8}$ gives the grams of pyrethrin I per 100 ml. of extract. Similarly the number of ml. of 002 N NAOH consumer in paragraph (9) times $0.00374 \times \frac{100}{8}$ gives the grams of pyrethrin II per 100 ml.

Method IV. Determination of Pyrethrins in Pyrethrum Concentrates

(12) Reflux a sample containing approximately 200 mg. of pyrethrins (1 g. of a 20% concentrate) with 15 ml. of 0.5 N alcoholic NaOH for two hours. Cool, transfer to a liter beaker and process as in paragraph (5) et seq. The 200 ml. aliquot taken corresponds to $\frac{1}{2}$ of the sample. Therefore the number of ml. of 0.02 N NaOH consumed in paragraph (7) times $0.0066 \times \frac{100}{\text{sample} \times \frac{1}{2}}$ gives the percentage of Pyrethrin I. Similarly the number of ml. of 0.02 N NaOH in paragraph (9) times $0.00374 \times \frac{100}{\text{sample} \times \frac{1}{2}}$ gives the percentage of pyrethrin II in the sample.

Note: Test a sample of all extracts and concentrates for freedom from oxidized pyrethrins (which are insecticidally inert) by diluting to approximately 200 mg. of pyrethrins per 100 ml. with petroleum ether. If solution is not clear, treat analytical sample in same manner adding 1 g. filter cel to solution. Place flask in refrigerator for at least two hours, filter and wash quantitatively through Gooch crucible. Evaporate solvent, proceed as in (11) or (12).

**If an emulsion forms, add a few crystals ofsodium chloride and shake.

SPECIFICATIONS FOR GENUINE PURE CARNAUBA WAX

Latest revision of specifications of American Wax Importers and Refiners Association.

THESE specifications, developed by the American Wax Importers and Refiners Association, were revised November, 1957, superseding the specifications of June, 1955.

They cover the types and grades listed in Table I.

The color of types 1, 2, 2A and 3 CRUDE shall be no darker than that of the official color card of The American Wax Importers and Refiners Ass'n. or unless otherwise agreed upon by the seller and the purchaser.

The wax shall be an original virgin product made directly from the powder obtained from the leaves of the Carnauba Palm (Copernia Cerifera). It shall be free of extenders or admixtures of other substances and shall conform to the following requirements and shall be so guaranteed by the seller.

Genuine Pure Filtered Refined Wax must conform to the specifications in Table II and the wax shall be free of extenders or admixtures of other substances and shall be so guaranteed by the seller. These specifications are based on prescribed test methods which are available from the American Wax Importers and Refiners Association, 36 W. 44 St., New York 18, New York.

TABLE I

Types and Grades of Carnauba Wax

Brazilian Designation		*American Designation*
Type 1 — Flor	=	Flor
Primiera	=	Prime or No. 1 Yellow
Type 2 — Medina	=	Medium or No. 2 Yellow
Type 2A — Roxa	=	Roxa or No. 3 Yellow
Type 3 — Cauipe	=	Cauhype
Gorda Clara	=	Gorda Clara Light Fatty No. 2 North Country
Type 4 — Gordarosa	=	Fatty Grey or No. 3 North Country
Type 5 — Arenosa	=	Chalky

TABLE II

Composition and Properties of Carnauba Wax

	CRUDE			*REFINED*	
	Yellow Types 1, 2, 2A	*Fatty Types 3 & 4*	*Chalky Types 5*	*Yellow Types 1, 2, 2A*	*Fatty Types 3 & 4*
Melting Point — minimum	83°C 181.4°F	82.5°C 180.5°F	82.5°C 180.5°F	83°C 181.4°F	82.5°C 180.5°F
Flash Point — minimum	310°C 590°F	299°C 570°F	299°C 570°F	310°C 590°F	299°C 570°F
Volatile Matter (moisture included) — max. percent	2.0	1.5	6.0	negligible	negligible
Moisture — maximum percent	2.0	1.5	6.0		
Insoluble Impurities — maximum percent	1.0	2.0	1.5		
Acid Number — minimum	2.0	4.0	4.0	2.0	4.0
Acid Number — maximum	6.0	10.0	10.0	6.0	10.0
Saponification Number — minimum	78.0	78.0	78.0	78.0	78.0
Saponification Number — maximum	88.0	88.0	88.0	88.0	88.0
Paraffinic Hydrocarbons — maximum percent	2.0	2.0	2.0	2.0	2.0
Resinous Matter — maximum percent	5.0	3.5	3.5	5.0	3.5
Benzene Solubility — Maximum percent	8.0	8.0	8.0	8.0	8.0

COCKROACH AEROSOL TEST METHOD

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that if the test insects are to be held under observation longer than 48 hours, they be furnished food and water at the end of the initial 48-hour observation period. Insects that withstand insecticide treatments shall be destroyed and in no case returned to the stock cultures or employed in further tests.

The basis of comparison shall be the average percentage dead and moribund of the test sample as compared with that of the OTA. In reporting the test results the test sample shall be reported as "meeting the standard" if its average percentage dead and moribund determination at 48 hours is equal to, greater than, or within 10 percentage points less than that of the OTA employed in conjunction with it. In no case shall actual numerical values be reported officially or any letter grade designation be assigned to the test samples as a measurement of their effectiveness against cockroaches. The accompanying table records the results of a typical series of tests.

IV. CONDITIONS FOR OFFICIAL EVALUATION

A. The test shall be conducted in accordance with the procedure previously described.

B. Twenty test groups of insects, numbering 20 cockroaches each (10 test sample, 10 OTA), shall be employed in making an official evaluation.

C. The average dosage shall be approximately constant throughout a given series of tests and of such magnitude as to give an average of from 50 to 75 per cent of the OTA treated cockroaches dead or moribund 48 hours after spray application.

D. The toxicity of the test sample shall be reported as meeting the standard if its average percentage dead and moribund determination at 48 hours is equal to, greater than, or within 10 percentage points less than that of the OTA run in conjunction with it. In no case shall numerical values be reported or any letter grade designations be assigned to the test samples as a measurement of their toxicity to cockroaches.

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(Adopted by Insecticide Division, Scientific Committee, Dec. 5, 1955, and by SCMA Board of Governors, Dec. 7, 1955.)

AEROSOL AND PRESSURIZED SPACE SPRAY INSECTICIDE FOR FLYING INSECTS

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(This Method was adopted by CSMA Board of Governors, Oct. 5, 1960. It supercedes CSMA Aerosol Test Method for Flying Insects adopted by the Board of Governors, Dec. 10, 1958, CSMA Proceedings, May, 1960.)

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